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ABSTRACT

This paper summarizes responses of students in grades K-3 to questions about Native Americans. The paper draws on findings from two studies, both done in a suburban school system deemed "average" on a variety of educational and socioeconomic indicators. In each study, samples of students stratified by gender and achievement level were interviewed individually about topics addressed in social studies. Analyses focused not just on the accuracy of responses, but on their qualitative nuances that provided insights into students' ideas, including their misconceptions. Responses across grades K-3 suggest that students' knowledge and thinking about Native Americans tends to proceed through the following stages: (1) no knowledge; (2) cartoon stereotypes of the appearance or behavior of Indians; (3) Indians as the first people in America, wilderness survivors, and teachers of and learners from the Pilgrims and other early Europeans; (4) knowledge about Indians' lives and cultures and empathy with them as noble ecologists and victims of European aggression and greed; and (5) distancing and loss of empathy as attention shifts to the pioneers and the westward expansion of the United States. Implications for planning curriculum and instruction for elementary social studies are discussed with recommendations for classroom teachers and curriculum planners. (Contains 36 references.) (BT)

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PRIMARY-GRADE STUDENTS' KNOWLEDGE AND THINKING
ABOUT CLOTHING AS A CULTURAL UNIVERSAL

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Abstract

The traditional K-3 social studies curriculum has focused on cultural universals. Very little information exists about children's prior knowledge and thinking (including misconceptions) about these topics. This study was designed to provide such information with respect to the topic of clothing, and in the process to assess claims that primary-grade students do not need instruction in the topic because they learn what they need to know about it through everyday living. Individual interviews were conducted with 213 K-3 students, stratified according to grade level, socioeconomic status level, achievement level, and gender. Analyses of their responses indicated that most students understood that clothing is a fundamental human need, could describe the nature of and reasons for different types of clothing (business, work, play), knew something about clothing in the past and how clothing has been improved over time, and could talk about where to shop for a shirt and factors to take into account in deciding which shirt to buy (appearance, size, quality, etc.). Despite this knowledge of the surface aspects of clothing, only about a-fourth of the students understood that cloth is a fabric woven from thread and only about an eighth understood that thread is spun from raw material. Few students were able to say much about inventions responsible for improvement of clothing over time, why clothing is manufactured in particular places, or why certain societies have more clothing options available to them than others. The students' knowledge about shoes paralleled their knowledge about clothing in that they had much more to say about the surface features of shoes than about their substance or the details of their manufacture. Most variables showed noteworthy advances in accuracy and completeness of knowledge as students progressed through the K-3 range, but relationships with SES level, achievement level, and gender were much weaker and less often statistically significant. Findings are discussed with respect to the nature and extent of K-3

students' knowledge about clothing, ways in which this knowledge might be taken into account in planning instruction on the topic, and ways in which a powerful unit on clothing would differ from the trite treatments of the topic typically found in elementary social studies textbook series.

The social studies curriculum in the primary grades tends to be a loose amalgam of three main sources of content: (1) socialization of students concerning prosocial attitudes and behavior as members of the classroom community; (2) introduction to map concepts and skills; and (3) introduction to basic social knowledge drawn mostly from history and the social sciences. The authors view each of these curriculum components as important, but our research has focused on the social knowledge component because instructional materials focusing on this content leave much to be desired. Good materials are available for teaching about maps (in several textbook series) and about becoming a prosocial member of the community (in widely distributed ancillary materials), but there is much dissatisfaction with the knowledge component of early social studies, especially as it is represented in the leading textbook series (Beck & McKeown, 1988; Beck, McKeown, & Gromoll, 1989; Brophy, 1992; Brophy & Alleman, 1992-1993; Brophy, McMahon, & Prawat, 1991; Egan, 1988; Larkins, Hawkins, & Gilmore, 1987; Ravitch, 1987; Woodward, 1987).

Much of the basic knowledge content taught in the primary grades focuses on the universal human needs of food, clothing, and shelter or on other cultural universals such as families, communities, occupations, and transportation. Ravitch (1987) dismissed this content as "tot sociology," arguing that it holds little interest or value for students, partly because they already know it from everyday experience. Larkins, Hawkins, and Gilmore (1987) also suggested that primary students already know most of this content, so there is no need to teach it in school. The authors of this report have disputed these arguments, suggesting that the knowledge about cultural universals that children develop through everyday experience tends to be tacit rather than well-articulated. Furthermore, much of it is confined to knowledge about how things are without accompanying understandings about why they got to be that way, how they

vary across cultures, or the mechanisms through which they accomplish human purposes (Brophy & Alleman, 1996).

Recent developments in research on teaching suggest the need for data that speak to this issue. Increasingly, theory and research have been emphasizing the importance of teaching school subjects for understanding, appreciation, and life application, using methods that connect with students' prior experience and engage them in actively constructing new knowledge and correcting existing misconceptions. In mathematics and science, rich literatures have developed describing what children typically know (or think they know) about the content taught at their grade levels. This information informs the design of curriculum and instruction that both builds on students' existing valid knowledge and addresses their misconceptions.

There is potential for applying similar methods in social studies if more is learned about children's ideas about topics commonly taught at school. So far, little such information exists about topics addressed in K-3 social studies. Child development researchers have concentrated on cognitive structures and strategies that children acquire through general life experiences rather than on their developing understanding of knowledge domains learned primarily at school. Research in the Piagetian tradition has focused on mathematical and scientific knowledge, although there have been some studies of stages in the development of economic, political, and social knowledge (Berti & Bombi, 1988; Furnham & Stacey, 1991; Furth, 1980; Moore, Lare, & Wagner, 1985).

Nor have scholars concerned with curriculum and instruction developed much such information. There have been occasional surveys of knowledge about particular social studies topics (Guzzetta, 1969; Ravitch & Finn, 1987; U.S. Office of Education, 1995a, b). However, these have concentrated mostly on isolated facts such as names, places, or definitions, with

reporting of findings limited to percentages of students able to answer each item correctly. To be more useful to educators, the research needs to emphasize questions that probe children's understanding of connected networks of knowledge and analyses that focus on qualitative aspects of their thinking about the topic, including identification of commonly held misconceptions.

Significant progress has been made in studying children's developing knowledge of politics and government. For example, children are much more aware of the administrative than the legislative or judicial aspects of government and they tend to view presidents as godlike figures notable for their power to get things done and their benevolence or caring about the needs of each individual citizen (Connell, 1971; Greenstein, 1969; Hess & Torney, 1967; Moore, Lare, & Wagner, 1985; Stevens, 1982). Research on economics knowledge has begun to uncover stages in children's development of understanding of, as well as common misconceptions in their ideas about, such topics as the functions of banks and the operations of retail stores (Berti & Bombi, 1988; Berti & Monaci, 1998; Byrnes, 1996; Jahoda, 1984; Schug, 1991).

Several teams of investigators have studied children's historical learning (Barton & Levstik, 1996; Brophy & VanSledright, 1997; McKeown & Beck, 1994). This work has demonstrated, for example, that much of the historical knowledge of fifth graders is organized in narrative form, so that it tends to feature stories focused around a few hero figures rather than less personalized causal analyses of historical trends. The students' narratives also tend to compress time and space by depicting face-to-face interaction between people whose life spans did not overlap (e.g., Columbus and the Pilgrims).

Very little information is available concerning children's knowledge and misconceptions relating to the cultural universals emphasized in K-3 social studies curricula. As a first step

toward developing such information, we interviewed middle-class students late in the spring of second grade on various aspects of the topic of shelter (before and after they experienced an instructional unit on the topic). Shelter is not only a cultural universal but a basic need, and all of the students had had experience with it throughout their lives. Thus, if Ravitch and others had been correct in their assertion that children develop clear knowledge about such topics through everyday experience, we should have seen such knowledge demonstrated by middle-class children who were nearing the upper end of the primary-grade range. Instead, we found that the students' prior knowledge about topics relating to shelter was limited and spotty, tacit rather than well-articulated, comprised of loose collections of observations rather than well-integrated knowledge networks that included awareness of connections and understanding of cause-effect relationships, and often distorted by inaccurate assumptions or outright misconceptions (Brophy & Alleman, 1997).

These findings motivated us to launch a series of studies on developments across Grades K-3 in students' knowledge and thinking about cultural universals. Our intention is to generate findings that will have immediate value to social educators interested in developing more powerful curriculum and instruction for the early grades and teaching in ways that connect with students' prior knowledge. We also expect the findings to be of interest to scholars who study developments in children's general cognition or domain-specific knowledge.

All of these studies involve interviewing large samples of students stratified according to grade level (K-3), prior achievement level (high, average, low), and gender (boys, girls). In addition, the first two studies (including this one) involved stratifying students according to the socioeconomic status (SES) of the populations served by their respective schools (upper middle-class suburban, middle-class suburban, lower middle-class urban). Interview protocols feature

questions designed to elicit extended statements of students' thinking about the topic. Responses are coded for the presence of commonly mentioned themes or response elements, and scores derived from these codes are subjected to quantitative statistical analyses. In addition, unusual responses or elaborations of common responses that go beyond the basic ideas represented by the coding categories are listed and discussed in the reports. Analyses focus on general levels of knowledge and trends observed across grade levels, but with attention to how these trends interact with prior achievement level and gender. Findings are discussed with emphasis on their potential implications for curriculum and instruction in primary-grade social studies and on what they suggest about more general developments in children's social knowledge and thinking.

The Shelter Study

The first study in this series focused on students' knowledge and thinking about shelter. It replicated the findings of our pilot study and extended them in several respects. Its findings are presented in detail in a technical report (Brophy & Alleman, in press) so they are summarized only briefly here. Analyses indicated that responses emphasized description over explanation and form over function. The students recognized differences in the sizes, construction materials, durability, and general quality of the shelter provided by different forms of past and present housing, but they did not understand much about the historical, geographical, or cultural reasons for these contrasting housing styles. In thinking about contemporary housing, they focused on what is visible inside and outside the home but did not show much awareness of what is in between the walls or beneath the building. They knew that shelter is a basic and universal human need, but they were less appreciative of modern homes as controlled environments for comfortable living that cater to a great many of our wants as well as our more basic needs. Most

showed only very limited awareness of the mechanisms through which modern houses are supplied with water, heat, light, and other conveniences.

Although the students displayed knowledge about evolution in forms of housing over time, they did not know much about why particular forms were emphasized by particular groups. There was very little recognition that housing types reflect differences in climate and local availability of construction materials, and little mention of the portability of tipis or the defensive value of pueblos. Most students were not aware that certain tribes were nomadic societies that moved with the buffalo, so they did not appreciate that portability was a crucial quality of tipis. Most were able to make sensible statements about differences between pueblos and longhouses (e.g., in size or construction materials), but few mentioned differences in climate and geography as factors contributing to the differences between these two forms of Native American housing.

The students' responses concerning log cabins and pioneer life were more accurate and less fanciful than their responses concerning Native American homes and cultures. Even so, misconceptions were common (e.g., that the cabins could easily collapse because the logs weren't nailed together). Furthermore, most of the students emphasized the deficiencies of these homes in comparison with contemporary housing rather than appreciating them as inventive adaptations to their time and place.

Concerning shelter in today's world, most students understood that people have to pay for shelter and that most people prefer homes to apartments. If anything, they may have exaggerated the latter preference, which perhaps was to be expected given their ages and the fact that most of them lived in homes located in suburbs that emphasize family living. They said that homes offer more living space, the privacy and independence that comes with ownership, and extras such as

patios, decks, and yards. Most had difficulty explaining what is involved in renting apartments and why some people choose to do so.

The students possessed only limited and spotty knowledge of the economics of housing. Only a few understood that renting is a profit-making business or that people can get mortgage loans to allow them to move into a home before they have accumulated its full purchase price. No student ever said anything that indicated knowledge of the build-up of equity, the appreciation of property value, or other concepts relating to investment or economic assets.

The students also displayed limited and spotty knowledge about the utilities supplied to modern homes. Almost all understood that water is piped into the home, but many were vague or incorrect about the sources of this water, did not appreciate that the water is drawn from fresh- rather than salt-water sources and purified before being sent to homes, and did not realize that it arrives at the homes under pressure. Most of the students understood that thermostats are used to adjust heating, but were vague about where the heat comes from or how the system works. Only 13 percent clearly understood that furnaces contain a fire that heats air which is then circulated throughout the house. Students' thinking appeared to progress from believing that a utility company supplies heat directly and the furnace is merely a storage place, to knowing that heat is generated in the furnace but not knowing how, to knowing that the furnace contains a fire that heats air. A majority of the students knew that electricity is involved in creating light, because they knew that one must throw a switch to allow electricity to enter the bulb. However, they were unable to explain how the arrival of electricity causes the bulb to light up.

Most students understood that we pay for our utilities, although most were unclear or incorrect about whom we pay and for what. Most students in the K-3 range understood that families (except for those who have their own wells) pay for water that is piped into their homes,

according to how much they use. However, most were unclear or incorrect about payment for heat and light. Few students understood that “heating” bills are actually for natural gas consumed in fires that create heat in furnaces or that “light” bills are actually for electricity consumed when light bulbs are activated.

Overall, the findings on shelter supported our claim that K-3 students’ knowledge about cultural universals is tacit rather than well articulated, restricted to knowledge of what is in the absence of connected understandings of how and why it got to be that way, and frequently distorted by gaps and misconceptions. We now turn to the presentation of findings from our interviews on clothing (the second in our ongoing series of studies on cultural universals).

Sample

Our original plan called for conducting clothing interviews with 216 students, 54 in each of Grades K-3, stratified within each grade by SES of the community, students’ prior achievement levels, and students’ gender. However, three tapes proved to be unusable, so the actual sample comprised 213 students, 54 in both kindergarten and first grade, 53 in second grade, and 52 in third grade.

Socioeconomic status variation was introduced by conducting one third of the interviews in each of three communities. The first was an upper-middle class suburban community. Its students score very high on state assessments and other indicators of educational achievement. Almost all of them complete high school and most go on to college. The second community is a middle/working class suburb. Its students also score well on achievement indicators and heavy majorities of them graduate from high school, but only about half of these graduates go on to college. The third community is a small city (population about 160,000). Its students do not

perform as well as the students in the two suburbs on state assessments and other achievement indicators, and they show notably lower rates of high school graduation and college attendance. However, these rates vary considerably by neighborhood. The schools in which we interviewed students would be considered average or slightly above average for the city as a whole. Most of their students came from lower-middle/working class families.

The students we interviewed in all three communities were predominantly white, reflecting the make-up of their school populations. We did not consider race or ethnicity in identifying students for the sample, except for the stipulation that all included students must have spent all or at least most of their childhood in the United States. Recent immigrants or students who had spent most of their preschool years in other countries were not included, because an assumption underlying the work is that what the students knew about clothing (other than what they had been taught at school) had been learned in the process of growing from infancy in the contemporary United States (particularly through home and neighborhood experiences and exposure to television and other media).

Interviewees were selected from among students whose parents gave us permission to do so. Most parents who returned our forms did give such permission, although some parents never returned the forms despite repeated requests. Once the potential interviewees in a given classroom were identified, they were listed alphabetically by gender and the teacher was asked to characterize them, within gender groups, as being within the upper third, the middle third, or the lower third in general academic achievement. When we had access to more students in a given cell (e.g., high socioeconomic status, high achieving, male first graders) than we needed, the students to be interviewed were selected randomly from within the eligible group. When additional students were needed to fill out certain cells, we expanded sample recruitment to a

second and in some cases a third school in the same district. The schools were all representative of their respective districts, in the average SES range for the families served by the districts.

Interview Development

We developed an interview protocol designed to elicit students' thinking about what we consider to be key ideas that ought to be emphasized in an elementary social studies curriculum that treats clothing as a cultural universal. The content base for the interview was synthesized from three general sources: (1) social studies education textbooks and other sources that identified key ideas about clothing that are rooted in the social science disciplines; (2) information about clothing typically included in elementary social studies textbook series or in children's tradebooks on the topic; and (3) our own ideas about the key features of elementary social studies units that focus on cultural universals and are designed to teach the material for understanding, appreciation, and life application (Brophy & Alleman, 1996). We believe that the most basic and important ideas for children to learn about clothing concern its nature (garments are woven from thread/yarn which is spun from cotton, wool, or some other raw material) and purposes (protection, modesty, decoration, identification). Other important ideas include knowledge about the ways in which clothing has evolved over time, the different kinds of clothing worn in different places and cultures, the different kinds of clothing worn in our culture for different settings and purposes (business, work, play) and the reasons for these contrasts, and issues to consider in making decisions about clothing.

After identifying and sequencing the content base to be addressed in the interview, we developed and revised initial drafts of the interview protocol. These drafts featured primarily open-ended questions, typically followed by planned probes, designed to elicit extended

statements of students' knowledge and thinking about the topic. Probes were designed to reveal whether students understood and could explain the concepts or relationships addressed by the initial questions (and if not, what alternative concepts or relationships they might have constructed). Most questions were purely verbal, but one was accompanied by a photo.

The "funnel" interview technique was used, in which initial broad questions encourage students to make extended statements about a topic, attending to whatever aspects of the topic they select for focus on their own initiative, and explaining themselves in their own words. Probing then begins with follow-up questions asking (if necessary) for clarification or elaboration of what students have said in their initial statements. Finally, more specific questions are asked (if necessary) to call students' attention to aspects of the topic that they did not address spontaneously. This approach maximizes the degree to which students' responses reflect their own unique stances toward and construction of knowledge about the topic, and it minimizes the cueing of specific responses through suggestive questions. Yet, it also ensures that all of the students address certain key aspects of the topic (either because they do so spontaneously in responding to initial broad questions or because they are asked more specific questions later).

Successive drafts of the interview were piloted with students who were not involved in the later study. This pilot work led to revisions designed to make sure that all questions were clear, to specify probing and follow-up questions more completely, and to eliminate questions that were too easy or difficult to be useful. This process eventually yielded the final version of the interview shown in Appendix 1.

Collection and Preparation of Data

Students were interviewed individually. The interviews typically lasted 20-30 minutes and were conducted in small offices or other locations within their schools but outside of their classrooms. To facilitate rapport with students and make sure that their responses were preserved verbatim, the interviews were tape recorded, using a microphone that could be placed unobtrusively on the table and did not require either the interviewer or the student to handle it or speak directly into it. Interviewers were instructed to establish good rapport with the student before beginning and then to conduct the interview in a relaxed and conversational style rather than a more formal or test-like style.

The tape recorded interviews were transcribed by one person and then listened to by a second person who identified omissions and inaccuracies. Data for statistical analyses were then developed by coding the corrected transcripts (occasionally consulting the tapes if necessary to clarify some ambiguity).

Coding the Transcripts

We did not attempt to force students' responses into predetermined coding categories. Instead, we allowed the categories to arise from the data, using what have been called analytic induction methods for developing grounded theory (Bogdan & Biklen, 1982; Glaser & Strauss, 1979; Patton, 1990). Coding schemes were developed by reading responses to each question and identifying common themes (very similar statements that embodied the same basic idea) that represented alternative ways to respond to the question. Responses then were coded for the presence or absence of mention of these common themes. Multiple codes were assigned if the student mentioned more than one of the themes. In addition to categories encompassing

common themes, each coding scheme contained an “other” category for flagging rare or unique responses. For example, the following schema was used to code responses to the second part of Question 4, which asked why workers wear work clothes.

Column 6: What reasons does the student give to explain why workers wear work clothes?

0. don't know/no relevant response (student cannot respond, fails to offer a substantive response that speaks to the question, or expresses guesses in a word or two but fails to make a coherent statement)
1. student only repeats reasons why people in general wear clothes, without speaking specifically to why workers wear work clothes
2. workers wear old or worn clothes so they don't ruin their better clothes or get them dirty
3. protection: work clothes protect workers from insect bites, slivers, or other bodily harm and minimize the degree to which they get grease, dirt, etc. on their bodies
4. other (student produces some other response that is substantive but not codable in the preceding categories)

The coding schemes were developed and refined by a primary coder who eventually coded all of the transcripts. Reliability was established with the assistance of a second coder who coded one-third of the transcripts (stratified according to grade level, socioeconomic status, achievement level, and gender). The process was as follows. First, the primary coder developed, refined, and edited a set of schemes to be used for coding responses to a series of related questions from the interview. Then, both the primary coder and the secondary coder used these schemes to code the responses of one-third of the students to those questions. Upon completion of this coding, the two sets of codes were compared and inter-coder agreement percentages were computed. Most coding schemes initially met our criterion of 60% exact agreement between coders and were used by the primary coder to code the responses of all 213 students (after making minor alterations or elaborations suggested by insights developed while coding to establish reliability). When coding schemes failed to meet the inter-coder agreement criterion, the coders analyzed the problem and made adjustments in the coding schemes, then coded the

one-third sample of responses again. Most of the revised coding schemes met the inter-coder agreement criterion at this point, but a few did not and were dropped. Across the 30 coding schemes used, exact agreement percentages ranged from 60% to 95%, average 76%. The complete set of coding schemes used to generate the data for this report is shown in Appendix B.

Once a coding scheme had met the reliability criterion and been revised as needed, the primary coder used it to code all 213 responses. In doing so, he coded each transcript twice, once to record an initial set of codes and a second time to check these for accuracy and make any needed corrections. He also developed a running list of the rare and unique responses that had been coded into the “other” categories, as well as any unusual elaborations of common themes that seemed worth preserving for possible inclusion in this report. Thus, the report encompasses not only the commonly observed response variations that were amenable to statistical analysis, but also the rare or unique responses and any elaborations on common responses that seemed worth including because they appeared to have theoretical or practical significance.

Once coding was completed, the codes were converted into scores that became the bases for statistical analyses. In most cases the codes were used as originally recorded. However, some codes generated very low frequencies, sometimes too low to serve as a basis for useful statistical analysis. In these cases, the codes were omitted from statistical analyses. Also, commonly occurring responses originally coded in the “other” category sometimes were broken out to create new scores. For example, inspection of the codes generated using the categories for explanations of why workers wear work clothes indicated that (1) only eight students had been coded “1” (responses were not germane to the question), and their responses didn’t seem worth separating from those of students coded “0” (unable to generate a substantive response); and (2) most of the “4” (“other”) codes were assigned to students who said that work clothes (often

construed as uniforms) are worn either because the bosses require it or so that people will know that the workers work for the company involved. Consequently, in deriving scores from these codes, the original “1” codes were combined with the “0” codes, the two common “4” codes were broken out separately, and the remaining handful of “4” codes were dropped (because there were too few to analyze). The following scores were then recorded and analyzed:

F. Why Do Workers Wear Work Clothes?

0. Doesn't know/no relevant response
1. So people will know that you work there
2. Protection from dirt (keep you clean)
3. Protection from hazards (keep you safe)
4. Required by company/boss

Finally, combination scores sometimes were created when low frequencies of their component codes precluded statistical analyses (and the combination scores would be meaningful) or when creating the combination scores allowed analysis of higher-order questions about the topic that could not be addressed directly using the individual component scores. For example, Question 14 asked about the steps involved in manufacturing a shirt or dress. Along with codes for each individual step they mentioned, students were assigned a number reflecting the total number of steps that they included in their responses (0=none, 1=1, 2=2, 3=3 or more).

Data Analysis, Interpretation, and Presentation

Scores derived from the codes were subjected to statistical analyses designed to reveal trends in the sample as a whole as well as contrasts across subgroups of students who differed in grade level, SES, achievement, level, or gender. These analyses included frequency distributions

and means reflecting the degree to which various ideas were expressed across the sample as a whole and within its stratified subgroups, correlation coefficients indicating the direction and degree of relationship among the variables, and Chi-Square analyses indicating when subgroup differences were large enough to reach statistical significance.

Initial inspection of the results of these analyses indicated that (1) the response patterns to most questions featured statistically significant and often quite dramatic grade level differences showing increases in level and accuracy of knowledge across the K-3 range, (2) the SES differences, the achievement level differences, and (especially) the gender differences were much smaller and less likely to reach statistical significance, and (3) most of the SES and achievement level differences that did appear were in the expected direction and thus not especially interesting or informative (that is, students who were higher in SES or prior achievement level tended to have more, or more accurate, knowledge than students who were lower in SES background or prior achievement level, but the same general developmental patterns were observed in each group).

Given the uniformity of this pattern (with very minor exceptions that are noted when the relevant data are discussed), we decided to organize the presentation of findings in this report as follows. First, findings from related clusters of questions are presented together. For each question cluster, data presentation begins with discussion of descriptive statistics and the progressions in students' knowledge across Grades K-3, illustrated with excerpts from 12 students' interview transcripts. We then present the findings on SES, achievement level, and gender differences. Except where the data indicate otherwise, we treat these group differences as relatively minor variations on the main themes established by the grade level differences.

Next, we turn to the correlational data, reporting noteworthy patterns that appeared in the relationships between the response categories under discussion and the categories used to code responses to other questions in the interview. These relationship patterns help us to interpret the meanings and implications of the various responses categories, both in their own right and relative to one another. They are especially helpful when the grade, SES, achievement level, or gender differences found for a response category seem counterintuitive (if the meaning of the category is taken at face value). In these cases, the correlational patterns sometimes indicate that the responses coded into the category in question had different meanings or implications (e.g., were either more or less sophisticated, for K-3 students) than the category descriptor seemed to imply.

After presenting these data, we turn to a more holistic analysis of what the findings suggest about developments in children's knowledge and misconceptions about clothing as they progress through Grades K-3. Along with the quantitative data shown in the tables, these analyses include consideration of the rare and unique responses and unusual elaborations of common responses that were recorded and analyzed for potential significance. Taken together, these findings are discussed with reference to previous findings (where available), the understandings we have developed about growth and change in children's knowledge and misconceptions relating to clothing, and the potential implications of these understandings for curriculum and instruction in elementary social studies.

Why People Need Clothes

The first two questions assessed students' understanding that clothing is a universal human need:

Question 1. All over the world, people wear clothes. Do they wear clothes because they need to, or just because they want to? . . . Why? . . . Are there any other reasons why people wear clothes?

Question 2 (If student's response to Question 1 only mentions keeping warm) Do they wear clothes in warm places like Hawaii? . . . Why?

The second question was included because the research was done in Michigan, and we anticipated that many students would respond to the first question by saying that people need clothes to protect them from cold or winter weather.

About 90% of the students understood that clothing is a basic need, and most explained their answers by citing either the need for protection against cold or the need for modesty. The following examples are representative of the responses elicited from students who varied across grade, SES, and achievement levels. They are segments drawn from verbatim transcripts of the interviews, although they have been edited to eliminate extraneous material (mostly final probes that failed to elicit any additional response).

A. Kindergarten Students

1. Lance (low SES, low achiever)

1. **Do people wear clothes because they need to, or just because they want to?** They want to. (Why?) So part of them won't be showing.

2. **Do they wear clothes in warm places like Hawaii?** (Question omitted)

2. Denise (average SES, average achiever)

1. **Do people wear clothes because they need to, or just because they want to?** They want to. (Why do you think they want to?) Because they don't want to go around and see everybody naked.

2. Do they wear clothes in warm places like Hawaii? Yes. (Why do they wear clothes?) I don't know.

3. **Luke** (high SES, high achiever)

1. Do people wear clothes because they need to, or just because they want to? They need to. (Why?) If they didn't wear clothes, then they would get cold, and . . . and if they didn't have shoes and socks on, they could step on some glass or a rock and hurt their foot.

2. Do they wear clothes in warm places like Hawaii? Um . . . (pause). Not much clothes. (Not much? Do they wear some?) Yeah. (Why?) Well, . . . um . . . No.

First Grade Students

1. **Heidi** (low SES, low achiever)

1. Do people wear clothes because they need to, or just because they want to? Cause they need to. (Why do you think so?) So if it's like cold, they could put some warm clothes on.

2. Do they wear clothes in warm places like Hawaii? Yes, they wear warm . . . they . . . Hawaii--it's hot, right? (Yeah, it's warm and dry there.) They can wear bathing suits and they can go swimming a lot and wear sandals. (Then they do wear clothes?) Yes. (Why do they wear clothes?) So if they're in a swimming pool, they won't get cold or anything or something like that.

2. **James** (average SES, average achiever)

1. Do people wear clothes because they need to, or just because they want to? They need to keep them warm from the winter, and in the summer to keep them cool cause they need summer clothes cause it's really hot. (Are there other reasons why people wear clothes?) So . . . like they need to so people won't see their body parts cause they don't want people to see that. (Are there other reasons why people wear clothes?) Let's see. Other reasons people wear clothes is because they just got to because if they don't wear clothes, then . . . they need to wear clothes because if they don't, they'll be cold in the winter and they don't want to be hot in the summer.

2. Do they wear clothes in warm places like Hawaii?(Question omitted)

3. **Anna** (high SES, high achiever)

1. Do people wear clothes because they need to, or just because they want to? They need to. (Why do you think so?) So they won't be cold.

2. Do they wear clothes in warm places like Hawaii? Um . . . bathing suits, and sometimes they wear clothes.

Second Grade Students

1. **David** (low SES, low achiever)

1. Do people wear clothes because they need to, or just because they want to? They need to. (Why do you think so?) Because if they don't have clothes, they can't even go into a store if they don't got no clothes on. (Are there other reasons why people wear clothes?) To keep them warm in the winter.

2. Do they wear clothes in warm places like Hawaii? (Question omitted)

2. **Tanya** (average SES, average achiever)

1. Do people wear clothes because they need to, or just because they want to? Because they need to. (Why do you think they need to?) To keep warm. (What else?) I don't know.

2. Do they wear clothes in warm places like Hawaii? Yeah. (Why do you think that?) Because, sometimes it's probably cold and sometimes it's probably hot. (Are there places where people don't wear clothes?) Africa. (What about Africa? They don't wear clothes or they do wear clothes?) I don't know.

3. **Mike** (high SES, high achiever)

1. Do people wear clothes because they need to, or just because they want to? Because they need to. (Why?) They help you keep warm and they protect you from scrapings and things.

2. Do they wear clothes in warm places like Hawaii? (Question omitted)

D. Third Grade Students

1. **Jason** (low SES, low achiever)

1. Do people wear clothes because they need to, or just because they want to? They need to. (Why?) So they have something to wear. (What are some other reasons why we need to wear clothes?) To keep warm. That's all.

2. Do they wear clothes in warm places like Hawaii? Yeah. (Why?) Because. [couldn't elaborate]

2. **Kevin** (average SES, average achiever)

1. Do people wear clothes because they need to, or just because they want to?

Because they need to because back . . . way back . . . my mom told me this--people did not have clothes and now today probably you don't feel like walking around without no clothes on. (Why else would you wear clothes?) To keep you warm.

2. Do they wear clothes in warm places like Hawaii? Once in awhile if they would get a cold breeze or a chilly day.

3. Carlie (high SES, high achiever)

1. Do people wear clothes because they need to, or just because they want to?

I don't know. I guess they need to and want to. (Need to and want to. Well, why do you think they would need to?) Well, I guess they just want to. (You think they just want to. Well, why would they want to, then?) They keep you warm, they . . . I don't know.

2. Do they wear clothes in warm places like Hawaii? Yeah, but they don't wear as much. They just wear skirts. (OK. So why would they wear clothes? They don't need them to keep them warm.) I don't know.

Grade Level Differences

Descriptive statistics for scores derived from Questions 1 and 2 are given in Sections A and B of Table 1. Most of these are simple frequency scores indicating the numbers of students in the sample as a whole and within each grade, SES level, achievement level, or gender group who were coded for mentioning the idea represented by the response category. The scores in Row B5 of Table 1 are means for the total number of explanations given. Sets of scores are underlined if the statistical analyses described below yielded significant relationships between the frequency of use of a response category and the students' grade, SES level, achievement level, or gender.

Table 2 gives information about the statistical significance of grade, SES level, achievement level, and gender differences in the scores shown in Table 1. The score distributions were subjected to Chi-square analyses to determine whether the differences observed reached the .05 level of statistical significance. Where significant relationships were

observed, we have placed Phi coefficients in Table 2 to indicate the direction and strength of these relationships. Positive numbers in Table 2 indicate that higher coding category usage scores (frequencies or means) were associated with higher grade level, higher SES, higher achievement level, or female students. Negative numbers indicate that higher frequencies or means were associated with lower grade level, lower SES, lower achievement level, or male students.

The letters “NL” indicate instances in which the Chi-square analyses yielded statistically significant results, but the group differences were nonlinear. That is, inspection of the group frequencies indicated some pattern other than a linear increase (indicating a positive relationship) or a linear decrease (indicating a negative relationship) across the progression of grade levels, SES levels, or achievement levels. Finally, in the majority of instances, where neither a number nor the letters “NL” appear, the blank space indicates that the Chi-square analyses did not indicate a significant relationship. These same types of tables and data presentation conventions are used in subsequent sections of this report.

Responses to the first two questions were coded together because Question 2 was simply an extension of Question 1, included to see if students understood that people need clothes for reasons other than protection from cold. The response categories coded reflected students’ thinking about whether people need clothes (Section A in Tables 1 and 2) and if so, why (Section B). Anything that the students said in responding to either of the first two questions of the interview was included in the coding for these categories.

More than 90% (193) of the 213 students stated without qualification that people do need clothes. However, 12 students said that people do not need clothes and another 8 students said that their need depends on the climate in which they live. Perhaps these students had seen photos

in National Geographic or other sources of information about life in the tropics that illustrated that people in some environments do not actually need clothes.

This pattern of responses contrasts somewhat with the pattern observed for parallel questions in our shelter interview. In that interview, all of the students stated that people need homes. Furthermore, even those who initially stated that people need homes for protection against cold weather nevertheless also stated that people need homes even in Hawaii (and were able to explain their answers by citing reasons other than the need for protection against cold weather). In these clothing interviews, however, 20 students maintained that people do not need clothes if they live in a warm climate. Most of these students were not aware of functions of clothing beyond protection from cold, so they viewed clothing as a social convention or personal preference rather than a fundamental need (a few of them may have understood the modesty function of clothing but been unwilling to talk about it due to embarrassment) . Thus, even though 90% of the students did recognize that clothing is a basic need, it appears that our needs for clothing are less obvious to K-3 students than our needs for food or shelter.

The most popular explanation for why people need clothes was the need for protection against cold (given by 153 students). In addition or instead, 99 students gave modesty explanations, 35 spoke of protection against dirt, sun, insects, injury, or other hazards, and 10 said that we wear clothes for decorative purposes or because they look good on us. Finally, 18 students could not explain why people wear clothes. Of these, 12 were the students who answered Question 1 by stating that people do not need clothes and the other 6 were students who said that people do need clothes but were unable to explain this answer.

Surprisingly, responses to Question 1 showed a nonlinear relationship with grade level instead of an increase with grade in the percentages of students stating without qualification that

people do need clothes. This response was given by 96% of the first and second graders, but by only 83% of the kindergarteners and 87% of the third graders. This nonlinear pattern was not expected, and we have no explanation for it (the correlations between categories for responses to Question 1 and all of the other coding categories did not yield interpretable patterns, and nothing that we know about cognitive development or the school curriculum across the K-3 range suggests an explanation for this finding). We also are unable to offer explanations, or even tentative interpretations, for most of the other nonlinear relationships that appeared in our analyses. Rather than continue to repeat our explanations for why this is the case (the nonlinear patterns were unexpected, their reliabilities are unknown, and nothing the correlational analyses or the extant research literature suggests clear interpretations), throughout the rest of this report we will simply describe nonlinear patterns without commenting on them (except in a few instances where we do have interpretations to suggest).

The students' explanations for why people need clothes did show the expected relationships with grade level. Most of the "doesn't know" and "can't explain" codes were for students in kindergarten and first grade. The mean number of response categories coded rose from 1.1 for kindergarten to 1.2 for first grade to 1.5 for second grade to 1.8 for third grade. Older students were coded significantly more often than younger students for mentioning protection against cold or protection against other hazards. The frequencies for mentioning modesty or decoration were in the same direction, although not statistically significant. In summary, even though responses to Question 1 showed a nonlinear relationship to grade level, the analysis of responses to Question 2 indicated that the older students were better able than the younger students to explain why people need clothes

Socioeconomic Status, Achievement Level, and Gender Differences

As shown in Tables 1 and 2, the responses to Questions 1 and 2 yielded nine sets of scores. Chi-square tests indicated that five of these showed statistically significant variation across grade levels. In contrast, only four sets of scores showed significant variation across SES groups, only one varied across achievement levels, and only two showed a gender difference.

The first two significant relationships with socioeconomic status were nonlinear, indicating that students in the middle SES group were more likely than students in either the lower or the higher SES group to say that people need clothes. These relationships were unexpected. The other two relationships indicated that higher SES students were more likely than lower SES students to explain that people need clothes for protection against cold or for protection against other hazards.

The only significant relationship with achievement level indicated that high achievers were more likely than low or average achievers to suggest that we wear clothes for decorative purposes or because they look good on us. It was mildly surprising that these analyses did not yield more significant relationships with achievement level.

The two significant gender differences indicated that boys were more likely than girls to suggest that people's need for clothing depends on the climate in which they live and to explain that people need clothes for protection against cold weather. These differences were part of a larger and perhaps noteworthy (although not statistically significant) trend for boys to emphasize protection explanations and girls to emphasize modesty or decoration explanations in talking about the functions of clothing.

In general, the group difference findings for responses to Question 2 establish a pattern that is repeated in the data for the remaining question clusters. The pattern includes four key

features: (1) the findings show large progressions across grade level for a majority of the response categories (especially those that reflect knowledge, as opposed to mere personal preferences); (2) the SES and achievement level findings also tend to show predictable progressions, but the group differences are usually much smaller and not statistically significant; (3) a few significant but nonlinear group difference patterns appear, but these usually are not easily interpretable and do not suggest important theoretical or practical implications; and (4) finally, statistically significant gender differences seldom appear.

Relationships Among Response Categories

Although our interests lay more in the group differences in response patterns, we also correlated scores for the different response categories, within and across question clusters, to see if any noteworthy relationships emerged. Most of these correlations were not especially interesting because they fit into one of three expected patterns. First, many were logically necessary negative correlations between mutually exclusive category alternatives within the same cluster (e.g., there was a negative correlation between the category for failure to give an explanation for why people need clothes and the category for stating that people need clothes as protection against cold weather). Second, many were logically necessary positive correlations that represented part-whole relationships (e.g., there was a positive correlation between the category for stating that people need clothes as protection against cold weather and the category for the total number of explanations given for why people need clothes). Third, there was a general tendency toward correlation within and across clusters in the length and quality of the students' responses (i.e., certain students were more likely than others to be unable to respond or to respond poorly to many questions; certain students were more likely than others to

consistently make lengthy and complex responses to questions; and certain students were better informed than others and thus more likely to make sophisticated responses consistently). Given that these three types of relationships were expected to appear and that the explanations for them are well understood, we will not describe them in this report unless there is some special reason to do so.

In addition to these expected relationships, however, the correlational analyses sometimes identified statistically significant relationships between response categories that would not necessarily have been predicted and that indicate interesting connections among students' ideas. Most of these interesting relationships involve categories that reflect qualitative differences in the ways that students approached the questions, as opposed to categories that reflect differences in the amount or accuracy of their knowledge. Interesting correlations involving categories for coding responses to Questions 1 and 2 were as follows.

Intercorrelations involving responses to Question 1 indicated that students who stated without qualification that people need clothes tended to give more correct or sophisticated responses to other questions as well. Students who said that the need for clothing depends on the climate frequently were unable to respond or gave low-level responses to other questions. Finally, no particular pattern appeared relating the response "People wear clothes because they want to, not because they need to" to responses to other interview questions. This was mildly surprising, given that low-level responses to any given question usually correlate with low-level responses to other questions. This suggests that the 12 students who gave this response were not simply lacking in knowledge or flawed in their reasoning, but instead took unconventional but perhaps defensible positions in interpreting and responding to the question. Indeed, although

clothing is commonly listed as a basic and universal human need, the case can be made that humans do not actually need clothing in warm climates.

Concerning responses to Question 2, students who said that clothing protects us from cold or winter weather were more likely than other students to say (in response to later questions) that workers wear work clothes for protection and that one way in which clothing has been improved is that today's clothes keep people warmer than clothes in the past did. This response also showed a modest pattern of positive correlations with more sophisticated responses to some of the other interview questions. The next response, that clothing provides protection from injuries, dirt, bugs, or other hazards besides cold weather, was correlated with a much broader pattern of sophisticated responses to many more of the questions. However, it was not correlated with other statements about protection against hazards.

Students who cited modesty as a reason for clothing did not allude to this in responding to other questions. However, these students showed a pattern of providing multiple responses, including relatively unconventional (but correct) ones. Finally, students who said that we wear clothes because they look good on us or for decorative purposes were more likely than other students to speak of trying on shirts and buying one that "looks good on you" in explaining the decision making involving purchasing a shirt. Thus, these students were more oriented than other students toward the aesthetic aspects of clothing.

Rare and Unique Responses

The following responses to Questions 1 and 2 involve interesting elaborations on the ideas represented by the coding categories or embody ideas that are not included in those

categories. Most such responses are paraphrased to save space and focus on the key idea, but a few seemed worth quoting verbatim.

Kindergarten: So no one will see their underwear; people don't want to walk around without clothes because they'd be walking around naked and people would make fun of them; some clothes can look pretty on you; they don't want to show their underwear; so people won't see them naked—because if you go out and do that, everyone will think that it's terrible; they need to wear clothes because nobody wants to see their private parts; because other people would see their private parts and think that they weren't very nice people—they would embarrass people; wear shoes so that people don't smell your feet.

First grade: So their bodies won't show; they have areas that are theirs, no one else's; to cover their private parts; they'd be naked and everyone would see their private things; they'll see your behind and make fun of you; going naked is illegal and will get you sent to jail; it's against the law to be naked outside; you are "supposed to" wear clothes; if they're naked, they'll get put in jail; clothes feel comfortable and allow you to look fancy.

Second grade: Clothes look pretty, feel comfortable; clothes feel good on you; clothes look good on you.

Third grade: You need clothes if it's cold, and you might want clothes for modesty reasons; they like the design on the clothes; clothes give you pockets to keep stuff in; clothes look good on you; so they look nice, not dirty or ratty; they dress up for church; clothes are colorful; to express how you feel and what style you like.

Some students, especially those who said that people need clothes but could not explain why, may have been embarrassed to talk about modesty, especially if the only ways that they could think of to express this idea involved using words they did not feel comfortable using (e.g.,

“because then people could see your booty.”). Among students who did bring up modesty, the younger ones tended to talk about the reactions of other people who might see you naked, whereas the older ones tended to talk more about your own internal feelings of embarrassment.

Discussion

A heavy majority, but not all, of the students understood that clothing is a basic need. Even so, many of the younger ones, especially kindergarteners, spoke from a childish or egocentric purview in response to this and other questions in our interview. The changes noted across grades in the nature of the responses reflect development from the pre-operational period to the concrete operational period as described by Jean Piaget (1983), along with increased exposure to relevant information in and out of school.

Responses to Questions 1 and 2 were mostly correct as far as they went and lacking in noteworthy misconceptions. However, these responses did indicate that many students had little awareness of clothing’s functions beyond protection from cold. It would be interesting to see how students living in a warm climate (e.g., Florida or Hawaii) would respond to Question 1. We would expect such students to put less emphasis on clothing’s protective function than our Michigan students did, and to the extent that they did talk about clothing as protective, to emphasize protection against sun or insects rather than against cold.

We conclude that K-3 students could benefit from instruction clarifying that clothing is considered a basic need for all people, regardless of the climate in which they reside, and that clothing has at least four noteworthy functions: (1) protection (not only against cold but against injury, dirt, insects, sun, and various other hazards), (2) modesty, (3) appearance enhancement/decoration, and (4) identification with a social group or cultural reference

(expressed through one's general style of clothing or through designs or logos associated with favorite sports teams, hobbies, artists, etc.). Students would learn that mores and expectations regarding these functions of clothing vary with climate and culture, but the functions themselves (and presumed needs that underlie them) are universal.

Types of Clothes

Questions 3-6 probed students' knowledge of major types of clothing worn in different situations (business clothes, work clothes, play clothes, and uniforms). Data derived from analyses of the students' responses to these questions are shown in Sections C through I of Tables 1 and 2. The questions were as follows:

- 3. Bankers and lawyers and certain other business people wear business clothes. Can you describe these business clothes that bankers or lawyers wear? . . . Why do they wear business clothes?**
- 4. People who work on farms or in factories wear work clothes. Can you describe these work clothes? . . . Why do workers wear work clothes?**
- 5. When we are just relaxing at home, we wear casual clothes, or play clothes. Can you describe these play clothes? . . . Why do we wear play clothes?**
- 6. Some workers wear uniforms, like the police or the people who work at McDonald's. Why do some workers wear uniforms?**

Almost three-fourths (159) of the students accurately described business clothes as semi-formal attire (although some of these students referred to "tuxedos" instead of suits or sport jackets). However, 20 students described business clothes as work clothes or uniforms, and another 44 (including 32 kindergarteners) were unable to respond to the question. When asked why business people wear business clothes, 120 students spoke of wanting to make a good

appearance to the public or to one's business clients. Of the remaining students, 71 could not respond to this question and another 22 could only give explanations that applied to clothing in general rather than business clothing in particular (e.g., business people wear clothes to protect them from the cold).

The students were even more successful in talking about work clothes. More than three-fourths (170) described work clothes as old, worn clothes that you do not mind getting dirty. In addition or instead, 73 said that work clothes are heavy and provide protection to workers and another 10 described them as uniforms. Only 32 students were unable to respond to the question.

When asked why workers wear work clothes, the most popular response (made by 111 students) was that these clothes protect workers from dirt, grease, etc. and thus help them to keep clean. Responses generated less frequently included the ideas that work clothes protect workers from hazards or injury (43), identify workers to the public as employees of the company (11), or are worn simply because they are required by the company or the boss (8). Most of the explanations focusing on identifying the worker as an employee of the company were made by students who described work clothes as uniforms. Finally, 62 students were unable to explain why workers wear work clothes.

The students were most successful in talking about play clothes. All but eight (205) accurately described play clothes as jeans, t-shirts, sweat shirts, shorts, or other casual clothes (several of the younger students included pajamas). Furthermore, only 26 students could not explain why play clothes are worn, although another 15 students only mentioned protection from cold or some other rationale that was not specific to the play setting. A majority (148) described play clothes as washable or clothes that you don't mind getting dirty, 21 said that they are worn

because they are comfortable, soft, or easy to relax in, and 14 gave other reasons (including the notion that play clothes are the default choice—you always wear them except when dressing up).

Finally, even though only 10 students had mentioned uniforms spontaneously when asked about work clothes, all but 32 were able to provide some explanation of why some workers wear uniforms. The most popular response was that uniforms identify workers to the public as employees of the company (141). Other explanations were that uniforms protect workers against dirt or hazards (36) and that the company or boss requires them (31). The remaining students gave miscellaneous “other” reasons, except for 7 who gave specific examples of the functional value of certain aspects of certain uniforms (tool belts or pockets, police holsters, etc.).

In general, the students knew more about the clothes with which they had personal experience (play clothes) than about types of clothing (business, work) worn primarily in adult work settings. Even when they did have general knowledge about the latter types of clothes, their ability to talk about them often was hampered by limited expressive vocabularies (e.g., terms such as “suit,” “sport coat,” “jacket,” “blazer,” or “overalls”).

The following examples are representative of the responses from students who varied across grade, SES, and achievement levels.

A. Kindergarten Students

1. **Lance** (low SES, low achiever)

3. Bankers and lawyers and certain other business people wear business clothes. Can you describe these business clothes that bankers or lawyers wear? They're white. (Anything else?) Could be blue or white or . . . orange. (Why is it that bankers and lawyers wear business clothes?) Cause they need to.

4. People who work on farms or in factories wear work clothes. Can you describe these work clothes? White clothes. (Why is it that workers and farmers wear work clothes?) Because they need to.

5. When we are just relaxing at home, we wear casual clothes or play clothes. Can you describe these play clothes? This is football clothes. (That's exactly right. That is a football shirt. Now, what about play clothes? Tell me about them.) My sisters have play clothes. (What do they look like?) One sister's play clothes are white and some are orange. (Why do all of us wear play clothes when we play?) Because we need to? (Why do you need to?) So no one will hit you.

6. Some workers wear uniforms, like the police or the people who work at McDonald's. Why do some workers wear uniforms? They don't want people to see them without clothes. (Are there other reasons why they wear uniforms?) So nobody will see their bodies.

2. Denise (average SES, average achiever)

3. Bankers and lawyers and certain other business people wear business clothes. Can you describe these business clothes? I don't know that one.

4. People who work on farms or in factories wear work clothes. Can you describe these work clothes? Yes, because so they won't get their other clean clothes dirty. (What do the work clothes look like?) I don't know.

5. When we are just relaxing at home, we wear casual clothes or play clothes. Can you describe these play clothes? If you didn't have play clothes, then you'd get all dirty and I don't know anything else. (Why do we wear play clothes when we want to play?) Because so you won't get them all messed up and you can probably wash it.

6. Some workers wear uniforms, like the police or the people who work at McDonald's. Why do some workers wear uniforms? Because they have to dress up in a uniform or they don't know which job they are in.

3. Luke (high SES, high achiever)

3. Bankers and lawyers and certain other business people wear business clothes. Can you describe these business clothes? Um . . . they wear like black tops and like black pants, and black shoes. (Why do they wear these clothes?) Um . . . (Any ideas?) No.

4. People who work on farms or in factories wear work clothes. Can you describe these work clothes? Well, they're like . . . farmers wear like a red and white shirt and some brown pants and brown shoes and a straw hat. (Do you know what factory workers wear?) No. (Why do farmers wear the clothes they do?) I don't know.

5. When we are just relaxing at home, we wear casual clothes or play clothes. Can you describe these play clothes? Sometimes you can wear some shorts and a t-shirt. (Why do we wear play clothes when we want to relax or play?) Cause it's hot out and

when you're playing basketball or baseball or something, you could get hot if you wear like a sweat shirt or like pants.

6. Some workers wear uniforms, like the police or the people that work at McDonald's. Why do some workers wear uniforms? I don't know. (Why do the people at McDonald's wear the uniforms they do?) I don't know. (Do you know why the police where the uniforms they do?) No. (Can you think of any reasons why people might want to wear uniforms?) No.

First Grade Students

1. **Heidi** (low SES, low achiever)

3. Bankers and lawyers and certain other business people wear business clothes. Can you describe these business clothes that bankers or lawyers wear? [Student makes an irrelevant response.] (Tell me about Mrs. Principal. She wears business clothes. What kind of clothes does she wear?) She wears skirts with some tights and high-heeled shoes and she wears a uniform that's kind of like a wedding person . . . that a groom has on. (Are you talking about a jacket?) Yeah, and underneath she wears a black shirt. (All right. Now why do business people like bankers and principals and lawyers wear business clothes?) Because they're a business person and they do all sorts of things like that and that's all I can think of.

4. People who work on farms or in factories wear work clothes. Can you describe these work clothes? I don't understand. (People who work on farms . . . what do they wear?) They wear boots if it's cold, and they wear a snow jacket and a hat with bird stuff on the side of it, and they wear really thick mittens. (All right. So why do workers wear work clothes?) So they look nice when they go to the business place. (Now we're talking about farmers and people who work in factories.) I'm talking about factories . . . they dress like a normal person that's . . . (Well, why do they wear work clothes?) I don't know.

5. When we are just relaxing at home, we wear casual clothes or play clothes. Can you describe these play clothes? OK. I'm wearing play clothes right now, and I ask my mom if I can go outside and she said yeah, and . . . (But what are you wearing?) I'm wearing a t-shirt and shorts cause it's summer, and sandals. (OK, why do you wear play clothes when you go out to play?) So the other clothes are for school and stuff if they still fit us, and you'll be able to have pants and stuff like that.

6. Some workers wear uniforms, like the police or the people who work at McDonald's. Why do some workers wear uniforms? Because they work at that place and it says McDonald Restaurant or something like that, or a Chinese place but I can't say Chinese, and if they work at some other place that's Japanese and Chinese . . . (Well, why do they wear these uniforms? Why do they do it?) I don't know. (What about the police? How does it help us and how does it help them for them to wear a uniform?) OK, I'm a police right here, right now. I'm riding in my car down the street and I turn on

my lights so everybody will know I'm a cop, and for the robber if there's a robber anywhere, . . . (Do the clothes help you?) Um . . . yeah. (How?) They have badges and it can tell a person there's police coming.

2. **James** (average SES, average achiever)

3. Bankers and lawyers and certain other people wear business clothes. Can you describe these business clothes that bankers or lawyers wear? Um hum. Like bankers wear these clothes . . . like breakers and they're gray and they wear ties. (Breakers? What's that?) Like gray clothes that have ties on them. [Blazers] (All right. They're usually gray. What else did you say?) They got ties on them and they just got to look good for the customers that come to the bank. (Why do they wear these clothes?) Because if they don't wear them, the customers will laugh at them and their boss says they have to wear them so they'll be nice at the bank because the bank is a nice place.

4. People who work on farms or in factories wear work clothes. Can you describe these work clothes? They're clothes that have big things that you hook them on and then they wear like shirts and they walk around picking up eggs and milking cows or making food. They gotta sell pigs for hot dogs and lots of food. (So why do workers wear work clothes?) Because they're workers. (Any other reason why?) No.

5. When we're just relaxing at home, we wear casual clothes or play clothes. Can you describe these play clothes? Yeah, they're like clothes like I'm wearing. (Yes. Tell me what you're wearing.) Like I'm wearing my brother's shirt because it fits me good and it got Looney Tunes on them and shorts are cool, and like jeans, some people think jeans are cool. (Why do we wear play clothes when we want to relax and play?) Because they just want to be cool or they just want to look nice to play.

6. Some workers wear uniforms, like the police or the people who work at McDonald's. Why do some workers wear uniforms? Cause they want to know they really do work at McDonald's or for the police. If they don't wear them, they don't know they're really police. Like one person calls the police and they think he's the police but he really ain't. (All right. Are there other reasons why people wear uniforms?) Probably they wear uniforms is because they just need to so they'll know they work at the place.

3. **Anna** (high SES, high achiever)

3. Bankers and lawyers and certain other business people wear business clothes. Can you describe these business clothes that bankers or lawyers wear? Lawyers wear these clothes and they wear ties and they wear like these kind of shoes [points to photo of men's dress shoes that is used for Question 20], and they wear their hair brushed back, and . . . that's about all. (All right. Why do they wear these clothes?) So they can look nice and lawyers have to wear clothes like that.

4. People who work on farms or in factories wear work clothes. Can you describe these work clothes? They have shirts and they have these straps over the shoulders, and

they have the pants that go with the straps on the shoulders. (I call those bib overalls. Is that what you call them?) Overalls. (Why do workers wear work clothes?) Because they're working. (Is that all?) So that their other clothes won't get dirty.

5. When we are just relaxing at home, we wear casual clothes or play clothes. Can you describe these play clothes? Sometimes shorts with holes in them, and regular old shirts, and sometimes long jeans with holes in them, and sometimes just jeans that are dirty. (Tell me; why do we wear play clothes when we want to play or relax?) So that we won't get our other clothes dirty.

6. Some workers wear uniforms, like the police or the people who work at McDonald's. Why do some workers wear uniforms? So that when people need help, they can ask a police officer and they'll know that it's a police officer. (What about the people who work at McDonald's?) So they know it's a McDonald's person and they know that it's not somebody else.

C. Second Grade Students

1. David (low SES, low achiever)

3. Bankers and lawyers and certain other business people wear business clothes. Can you describe these business clothes that bankers or lawyers wear? Like real dressed up clothes, like you wear. Some nice shoes. (Why do they wear those kind of business clothes?) They have to look good when they work, so when people come to cash their check, they have to be good to know their stuff.

4. People who work on farms or in factories wear work clothes. Can you describe these work clothes? Like if you're working on a car, you have to wear them old clothes that got paint and stuff on them, and you have to have a good something . . . well, not too good, but something to keep your hair not to get it so greasy, and gloves, dirty gloves for grease. (Why do you think workers like farmers and factory workers wear work clothes?) Because they don't want to get their new clothes dirty.

5. When we are just relaxing at home, we wear casual clothes or play clothes. Can you describe these play clothes? Like some old clothes like holey jeans--something like that that got holes in them and you don't go to school in them. (All right. Well, why do we wear play clothes when we just play and relax?) So you don't get your new clothes dirty.

6. Some workers wear uniforms, like the police or the people who work at McDonald's. Why do some workers wear uniforms? Like cops, they wear uniforms and they got that thing so they don't get shot. (What other reasons would they be wearing a uniform?) Because the McDonald people, they have to have caps and stuff for McDonald's. (Right. So why do they wear those caps and stuff?) For the people, so they look good.

2. **Tanya** (average SES, average achiever)

3. Bankers and lawyers and certain other business people wear business clothes. Can you describe these business clothes that bankers or lawyers wear? Um . . . they're nice and they're dressy and they like to dress up in them. (Why do they wear these clothes?) Because they have to look nice to go to work.

4. People who work on farms or in factories wear work clothes. Can you describe these work clothes? Well, they're . . . they wear farmer clothes that has straps around their arms and people who work in factories have pants with holes in them and stuff. (OK. Why do workers wear work clothes?) Because . . . I think they just want to.

5. When we are just relaxing at home, we wear casual clothes or play clothes. Can you describe these play clothes? They're dirtier than the new ones and they're just . . . I don't know. (Well, why do we wear play clothes when we want to relax?) Because our moms don't want us to get our new clothes dirty.

6. Some workers wear uniforms, like the police or the people who work at McDonald's. Why do some workers wear uniforms? Because people who work at like McDonald's and stuff like that--they have to wear uniforms for people to know that they work there.

3. **Mike** (high SES, high achiever)

3. Bankers and lawyers and certain other business people wear business clothes. Can you describe these business clothes that bankers or lawyers wear? They usually wear suits. They usually never wear shorts. (Do you know anything else they wear?) Suits. If it's a girl, they probably wear dresses. (Why do they wear these clothes?) I don't know.

4. People who work on farms or in factories wear work clothes. Can you describe these work clothes? Warm-up clothes, work clothes, jeans, t-shirts. (OK. Why do they wear these clothes?) Because they don't want to ruin any of their good clothes that they have.

5. When we are just relaxing at home, we wear casual clothes or play clothes. Can you describe these play clothes? Casual clothes and regular clothes--not really anything special. (What kind of clothes do we wear when we go out to play or are relaxing?) Just clothes. I don't know what kind. (Why do we wear play clothes when we want to relax or play?) Maybe they're more comfortable than other clothes. (What kind of clothes are more comfortable?) Sweat shirts, pants. (Any other reasons why we put on play clothes when we want to relax and play?) No.

6. Some workers wear uniforms, like the police or the people who work at McDonald's. Why do some workers wear uniforms? So the people that come there or

ask for help know that it's a police or if they work at McDonald's, they can tell that they work there. (Do you know why the police wear the uniforms they do?) So you know they're the police. (Are there any other reasons why people might wear uniforms?) No.

D. Third Grade Students

1. Jason (low SES, low achiever)

3. Bankers and lawyers and certain other business people wear business clothes. Can you describe these business clothes that bankers or lawyers wear? . Suits. (Anything else?) No. (Why do they wear these clothes?) So they look nice. (Are there other reasons? Why do they want to look nice on their job?) I don't know.

4. People who work on farms or in factories wear work clothes. Can you describe these work clothes? Dirty. That's all. (Why do workers wear work clothes?) So they can do things. (Such as?) I don't know.

5. When we are just relaxing at home, we wear casual clothes or play clothes. Can you describe these play clothes? Dirty. (Do they start out dirty when you're playing or do they end up that way?) They end up. (What kinds of clothes do you put on that can get dirty?) Jeans, shorts.

6. Some workers wear uniforms, like the police or the people who work at McDonald's. Why do some workers wear uniforms? So that they know they're a cop or whatever. (Why do people who work at McDonald's wear uniforms?) So they can go behind the desk. That's all.

2. Kevin (average SES, average achiever)

3. Bankers and lawyers and certain other business people wear business clothes. Can you describe these business clothes that bankers or lawyers wear? Yeah, it's like a suit that has dress pants, a vest with a tie and a white shirt. (Why do they wear these clothes?) Because the boss doesn't want them to be all grubby and walking in with shorts on. Probably they want them to wear the suit because maybe they've got hairy legs.

4. People who work on farms or in factories wear work clothes. Can you describe these work clothes? They've got overalls that hold the pants up, probably a short sleeve or a long sleeve, probably a hat to keep the sun from shining in their eyes. (Well, why do workers and farmers wear work clothes?) To show their boss or whoever they work for that they can be this nice.

5. When we are just relaxing at home, we wear casual clothes or play clothes. Can you describe these play clothes? Yeah, like dirty clothes or old clothes and probably shorts or something like that. (Why do we wear play clothes when we want to play?)

Because probably your mother don't want you getting your school clothes or party clothes all dirty so that she has to wash them all over again.

6. Some workers wear uniforms, like the police or the people who work at McDonald's. Why do some workers wear uniforms? To show that they're not like some other person that could sneak in there and act like they work there because some people . . . like the police gotta wear uniforms so that people know they're police, not like some guy walking out and saying "Hey, I'm on the police side."

3. Carlie (high SES, high achiever)

3. Bankers and lawyers and certain other business people wear business clothes. Can you describe these business clothes that bankers or lawyers wear? Bankers wear just like . . . they dress up in nice clothes like tuxedos and they have name tags, and lawyers have kind of like a dress like but not exactly and they have a name tag. (Why do lawyers and bankers wear these kinds of clothes?) So they know it's the banker or lawyer and they don't get them mixed up with somebody who's just there cause they might be back there stealing or something.

4. People who work on farms or in factories wear work clothes. Can you describe these work clothes? On farms they wear pants that they can get dirty and stuff so they don't get their good clothes dirty. (Can you describe these clothes--what they look like?) Like they wear kind of overalls and a shirt--t-shirt, you know.

5. When we are just relaxing at home, we wear casual clothes or play clothes. Can you describe these play clothes? Maybe pants and a shirt and a sweater, or just shorts and t-shirt. (Why do we wear play clothes when we want to relax or play?) So we don't get our good clothes dirty and they're more comfortable than wearing a skirt or something.

6. Some workers wear uniforms, like the police or the people who work at McDonald's. Why do some workers wear uniforms? So they know it's that person, I guess. I don't really know. (Well, think about it. Think about the people who work for the police. They wear uniforms.) Oh, so they can hold their badges and show that they've been through a lot of stuff-maybe like that. (Are there other reasons why they wear uniforms? Think about the people who work at McDonald's.) Um . . . I don't know why they wear them. I don't know.

Grade Level Differences

Most of the categories for responses concerning types of clothing showed significant relationships with grade level, including some particularly strong ones. For each of Questions 3-6, younger students were more likely to be coded for failure to respond to the question and older

students were more likely to be coded for correct or more sophisticated responses. The latter responses included describing business clothes as formal or semi-formal attire and stating that they are worn to present a good appearance to the public, describing work clothes as old or worn clothes that one can get dirty and explaining that they are worn to protect workers from dirt or other hazards, describing play clothes accurately and explaining that they are worn because they are washable or we don't mind getting them dirty, and stating that uniforms are worn to identify workers to the public as employees of the company. As with Questions 1 and 2, those students who were able to respond to Questions 3-6 tended to respond with accurate statements. The only exception to this (among responses that occurred often enough to appear as categories in the coding system) was the notion that business clothes are work clothes or uniforms. Thus, the students' ideas about the functions and types of clothing were relatively free of misconceptions.

Socioeconomic Status, Achievement Level, and Gender Differences

As shown in Table 2, analysis of the response categories for Questions 3-6 yielded 15 significant group progressions for grade level but only one for SES and 10 for achievement level, along with 6 gender differences.

The single significant relationship with SES and the 10 significant relationships with achievement level all reflected progressions in the expected directions, indicating that lower SES or lower achieving students were less able to respond to some of the questions and higher achieving students were more able to generate accurate or more sophisticated responses. These SES and achievement level findings follow the same general pattern seen in responses to both our shelter and our clothing interviews, except that in this case significant relationships with SES were found even less frequently and significant relationships with achievement level slightly

more frequently than usual. The paucity of SES differences here is somewhat surprising given that business and work clothes are associated, respectively, with upper middle class and working class jobs.

Perhaps the most interesting relationships involve the notions that play clothes are worn because they are comfortable, soft, or easy to relax in and that uniforms are equipped with special pockets, holsters, etc. These two responses showed significant (positive) relationships with achievement level but not with grade level. This suggests that they represent good reasoning by some of the more able students (e.g., see Carlie's response to Question 6) rather than general knowledge accumulated through general life experiences across the K-3 range.

There were more (6) significant relationships with gender in this data set than in most others. Girls were more likely to describe work clothes as old or worn clothes that you can get dirty or as uniforms, but boys were more likely to talk about them as protecting workers from hazards. Concerning play clothes, girls were more likely to say that we wear them because they are washable or we don't mind getting them dirty, whereas boys were more likely to be unable to explain why we wear play clothes or to supply "other" explanations not codable in the categories covering the most popular responses. Although not specifically predicted, some of these gender differences are not surprising in that they indicate greater female awareness of factors involved in keeping clothes clean and greater male awareness of the need for protection against job-related hazards.

Relationships Among Response Categories

Most of the significant correlations among categories for responses concerning different types of clothes were part of the "response sophistication pattern" in which failures to respond or

low level responses were correlated with one another and the most sophisticated responses were correlated with one another. This pattern subsumed most of the variables that showed positive relationships with grade level and achievement level. Other, smaller clusters of related categories included the following.

Students who said that work clothes were heavy, protective clothes were more likely than other students to say that workers wear work clothes for protection, that uniforms provide protection to workers, that the climate affects the kinds of clothing worn in other parts of the world, and that the season of the year would affect their own decision making in shopping for shirts. Thus, the notion of clothing as protective reappeared several times in their interviews.

A similar but somewhat larger pattern was seen for students who said that workers wear work clothes for protection. This pattern included the response categories just mentioned as well as categories for stating that people wear clothes for protection against cold weather, that today's clothes are better than clothes of the past because they keep us warmer, and that shoes are made partly of metal (this response appeared most frequently among students who spoke of special protective shoes).

Students who identified uniforms as work clothes were more likely than other students to say that people wear clothes to look good or for decorative purposes, to say that bosses require uniforms and that they are worn to identify workers as employees of the company, and to say that one consideration in selecting a shirt for themselves would be its match to their other clothes.

Students who said that play clothes are clothes that you don't mind getting dirty were also more likely than other students to say that workers wear work clothes to keep them clean.

Students who said that play clothes are comfortable clothes were more likely than other students to be coded for taking into account style or fashion in talking about what they would consider in buying a shirt (most of these responses identified sweat shirts, sweat pants, or other comfortable clothing).

In general, the intercorrelational data for the variables included in Tables 1 and 2 add little to the findings shown in the tables, other than to corroborate that the relationships among response categories conform to what would be expected based on what the tables show about the level of sophistication of the responses involved.

Rare and Unique Responses

The following responses to Questions 3-6 involve interesting elaborations on the ideas represented by the coding categories or embody ideas that are not included in those categories.

What Are Business Clothes and Why are They Worn?

Kindergarten: Lawyers (lawmen?) wear guns; bankers and lawyers wear suits and ties “so they look handsome;” bankers and lawyers wear suits and ties because “it’s their uniform so people will know if they see them driving and will get out of the way because they’re going to work and they might be late;” business people wear badges so people will know that they work in the bank; so they will know which job they have (lawyer or banker) and not get mixed up.

First grade: A few students at first confused bankers with bakers and started talking about baker hats and white aprons. This point was clarified for these students and the interview then continued. Rare and unique responses for first graders included: lawyers dress to “look like angels because they speak of God;” business people wear business clothes because they feel

more comfortable doing so in the work setting; so they won't get dirty or hurt; tuxedos (3); because they're rich.

Second grade: Describes casual clothes (thinks that only workers who face dangers need special clothes); pants and jeans, sometimes long-sleeved shirts; tuxedos (4); they think it's stylish to dress this way; bankers and lawyers can wear any clothes they want to wear; confuses lawyers with police and says that police need uniforms so we know who they are; so people will know they're workers at the company; so they'll look rich.

Third grade: They wear uniforms so people will know that they work there; tuxedos (3); they want to look macho (to show that they're in big business); so people will know that they have a lot of money; so people will know what company they work for.

What Are Work Clothes and Why are They Worn?

Kindergarten: Some workers wear a tool belt; workers wear work clothes "so that every people will know they're a worker and they work for something—at farms, police officers, or anything like that;" workers' clothes "look like clothes that real people wear who don't have to work;" farmers wear farmer clothes so that other people will know that they are farmers.

First grade: Farmers wear protective clothes so animals don't lick their skin; the boss tells the workers to wear work clothes; they want to act like a person who works there, not just a person who comes in there; they feel more comfortable wearing those clothes there; badges.

Second grade: "It's the law" (has the idea that different clothes for different jobs are mandated); to protect farm workers from sick animals' germs; pants, clothes, suits; the company gives you a uniform and you wear that; they feel comfortable; work clothes are like church,

business, and other kinds of clothes; comfort—so they don't get too hot; comfort; workers' clothes are designed to "match their work" (not explained further).

Third grade: To show that they're that kind of worker; hairnets, protective goggles; to keep your hair out of the food; farmers wear sunhats because they're usually redheads who sweat a lot; to show the boss that they can be "this nice;" so they look like a farmer; that's what they need and are meant to wear (not explained further); that's how their bosses want them to look.

What Are Play Clothes and Why Are They Worn?

Kindergarten: A few students initially thought that we were asking about doll clothes used in dressing up and playing with dolls. This point was clarified with these students and the interview continued. Rare and unique responses concerning play clothes included: describes play clothes accurately but then says that we wear them because we wouldn't want to wear our pajamas to play outside because we would get laughed at; talks only about wearing shorts to play sports during hot weather, instead of play clothes more generally; says that we wear clean play clothes so that we don't get the furniture dirty as we play.

First grade: You're not working, so you wear play clothes; you want to be "cool" and look nice while you play. Several other first graders, as well as a few older students, spoke of play clothes as the default choice (these are the clothes that you always wear except when dressing for some special occasion).

Second grade: Wears clean clothes to play, doesn't want to wear old raggedy clothes.

Third grade: Wear shorts or jeans because if you wore a dress on a swing, it would billow up; play clothes are in between work (dirty) clothes and business clothes—comfortable but neat and clean looking; you want to look nice; if you wear shorts, you can go swimming.

Why Do Some Workers Wear Uniforms?

Kindergarten: So when people come into the store, they will know what the store is called, if it (the name of the store) is not on the outside of the store; so people will know that they are a cop—if somebody thought they were not a cop, they might shoot them; so people will know who to ask if they want to know how to get out of the store (i.e., whom to ask about finding the exit); so people will know that it is a person who is going to be nice to them and try to help them; police wear special belts that are fitted for attaching special equipment to; McDonald's workers wear uniforms so that people who are confused about how to work the machines (apparently, soda dispensers) will know whom to ask for help and won't end up breaking the machines by trying to do things on their own; workers wear uniforms "to be fancy." In addition, several kindergarten students and a few older ones said "so they will know they're working at that place" or "they have to dress up in a uniform or they don't know which job they are in," or in some other way indicated that workers need uniforms so that they themselves know who they are and what they are supposed to be doing (as opposed to wearing them so that the public knows who they are). One such student specified that police need to wear uniforms "so they know that they'll kill people."

First grade: Police wear bulletproof vests; the uniform tells you their name; police uniforms have places to keep a gun, handcuffs, and stuff; police uniforms have special places for equipment like night sticks; work uniforms have special pockets for special equipment; because the uniform is for a special job; police don't look good in regular clothes; police clothes hold holsters, bullet packages, and walkie talkies.

Second grade: Workers wear uniforms to look good; McDonald's uniforms are usually dark so that food spills don't show up on them; police have places to keep their equipment;

police wear uniforms to look fancy so people will want to be friends with them; workers wear uniforms for style; uniforms give you “a nice look;” food service workers’ uniforms help keep them clean so that they don’t contaminate the food (i.e., they protect the public, not the workers or their clothes); workers wear uniforms to look casual.

Third grade: Uniforms help workers to keep in mind who they are, so they don’t act like someone else; McDonald’s uniforms match “the outside of the counter or something;” so they look nice; to look good; to show that they are important people; so show their rank; police uniforms include walkie-talkies.

Discussion

Several naïve or childish notions appeared among the rare and unique responses, as well as a fascination on the part of several students with police uniforms and equipment. In general, however, the rare and unique responses to Questions 3-6 contained fewer naïve ideas or misconceptions than most of the data sets in most of our interviews. Kindergarten students frequently were unable to respond to these questions (and supplied most of the responses that included naiveté or misconceptions), but most older students were able to describe business clothes, work clothes/uniforms, and play clothes accurately and explain their key characteristics and functions, even though they often lacked precise vocabulary for describing business and work clothes.

Cloth and Thread

Questions 7-9 focused on students’ knowledge about cloth and thread. They were designed to determine whether the students understood that cloth is woven from thread or yarn

and that thread is made by spinning raw material (and if not, to determine what alternative conceptions the students possessed).

7. What are our clothes made from? (If necessary, rub your own shirt/blouse and pants/skirt and ask): **What do we call this material that clothes are made out of?**

8. (If child has not said so already, say **Our clothes are made out of cloth.**) **What is cloth made from? . . . How is _____ made into cloth?**

9. Most cloth is made by weaving it from threads. Where do threads come from? (If necessary, probe by asking **How is thread made from _____?**)

Statistical information developed from students' responses to Questions 7-9 is presented in Tables 3 and 4. The tables indicate that the students produced a variety of responses to each of these questions. Many of these responses were correct or at least defensible as far as they went (but were incomplete or did not speak to the key issue addressed in the question). Many others involved misconceptions (although most of these involved good reasoning from limited knowledge bases or incorrect assumptions). Only a minority of the students understood that cloth is woven thread and an even smaller minority understood that thread is spun material.

When asked what clothes are made from, 85 students provided a correct generic term (cloth, material, fabric, etc.), and 69 named particular types of cloth (silk, cotton, linen, polyester, denim, etc.). In addition or instead, 88 students said animal skin (wool, fur, leather, etc.), 75 said thread (string, yarn, knitting, stitching, etc.), and 9 made "other" responses (usually incorrect). Finally, 25 students were unable to respond to this question. Most responses to Question 7 were free of clear misconceptions, but this was not true of many responses to Questions 8 and 9.

To set the stage for Question 8, students who had not already said so (in responding to Question 7) were told that the material that most of our clothes is made from is called cloth. Then they were asked how cloth is made. Only 57 students were able to say that cloth is woven or knitted from thread or yarn. Another 24 said that cloth is made from thread or yarn but could not explain how. The remaining coding categories indicated that 52 students were unable to respond to the question, 36 named animal or plant sources (fur, wool, cotton, silk, etc.) but did not display any knowledge of weaving, 27 thought that raw materials are processed directly into cloth (e.g., fluffy cotton is ironed or flattened by machines), 23 said that clothes are made by sewing together pieces of cloth (but displayed no knowledge that the cloth is woven), 7 thought that new cloth was made by recycling old clothes, socks, etc., and 17 supplied “other” responses (wood, straw, paper, gel, spider webs, etc.). It was clear that most of the students who did not describe cloth as woven from thread or yarn envisioned it as a solid material akin to leather, plastic, rubber, or paper.

To set the stage for Question 9, students who had not already said so (in responding to Question 8) were told that cloth is woven from threads. Then they were asked where threads come from. Only 27 of the students (about 12%) were able to state that threads are spun from raw material. More than one-third (79) could not respond, 44 thought that threads were (or were made from) found materials such as hair, animal skin, string, or what silkworms produce, 39 said that threads are manufactured using machines at stores or factories (but could not explain the process or gave some explanation that did not involve spinning raw material into threads), 18 thought that threads were obtained by cutting up or unraveling already existing cloth, and 15 gave “other” responses (suggesting that threads come from feathers, paper, silk, wool, weaving, etc.). In summary, although most students had generally correct ideas about clothing being

manufactured from substances derived from plants and animals, only about one-fourth of them understood that cloth is woven from threads and only about one-eighth understood that threads are spun from raw material.

The following examples are representative of the responses from students who varied across grade, SES, and achievement levels.

A. Kindergarten Students

1. Lance (low SES, low achiever)

7. What are our clothes made from? Rubber.

8. Our clothes are made from cloth. What is cloth made from? Wood.

9. Most cloth is made by weaving it from threads. Where do threads come from?
From the stores.

2. Denise (average SES, average achiever)

7. What are clothes made from? A factory on a machine. (What are they made out of?) I don't know.

8. Our clothes are made from cloth. What is cloth made from? Um . . . I don't know.

9. Most cloth is made by weaving it from threads. Where do threads come from? I don't know. (How is thread made?) I don't know.

3. Luke (high SES, high achiever)

7. What are our clothes made from? Some are made from . . . like sweaters are made from, I think, yarn. . . Socks are made from string. (What is this material that clothes are made out of?) I don't know.

8. Our clothes are made out of cloth. What is cloth made from? I don't know.

9. Most cloth is made by weaving it from threads. Where do threads come from? I don't know.

B. First Grade Students

1. Heidi (low SES, low achiever)

7. What are our clothes made from? Wool.

8. Our clothes are made out of cloth. What is cloth made from? (Actually some of our clothes are made from wool.) And some from yarn and thread. (OK, but our clothes are made of cloth. Now, how is that wool made into cloth?) I have no idea.

9. Most cloth is made by weaving it from threads. Where do threads come from? I don't like to say it, but I have no idea.

2. James (average SES, average achiever)

7. What are our clothes made from? From like wool or like fluffy stuff. Jeans are from wool, and then they get this machine and make the jeans hooked together on the side. (What do we call this material that your shirt is made out of?) Like really flat wool.

8. Our clothes are made out of cloth. What is cloth made from? Cloth is made out of . . . it can be made out of other things like people who cut off sheep's fur and make it into cloth. (How is wool made into cloth?) See, you take this thing and when you put it in and when it goes around this thing and it's like shaking the cloth and flatten it and make it into clothes.

9. Most cloth is made by weaving it from threads. Where do threads come from? (That's what you were describing for me--weaving it--weaving it from threads like this.) Yup. (Where does the thread come from?) Thread--it probably comes from . . . they probably cut off an animal's fur and it's really long and then they make it into colors and then they wrap it around one of those things.

3. Anna (high SES, high achiever)

7. What are our clothes made from? Clothing and scraps of clothing.

8. Our clothes are made out of cloth. What is cloth made from? Sometimes like sponge stuff. It kind of feels like sponge, but it's not. (What is it?) It's cloth. (What is cloth made out of?) Scraps.

9. Most cloth is made by weaving it from threads. Where do threads come from? Um . . . I don't think I know that. Maybe sometimes from cloth and scraps.

C. Second Grade Students

1. **David** (low SES, low achiever)

7. What are our clothes made from? Yarn. Some cotton and stuff is made from yarn and some-- like that shirt, is probably made out of yarn. (Actually we call this material.) Yeah, material.

8. Our clothes are made out of cloth. What is cloth made from? Um . . . yarn. (So then how is yarn made into cloth?) Cause it's thick. (Because it's thick? Well, tell me how they do it.) They have to go through loops and stuff.

9. Most cloth is made by weaving it from threads. Where do threads come from? (Now, where does this thread come from--or where does this yarn come from?) Um . . . I don't know.

2. **Tanya** (low SES, low achiever)

7. What are our clothes made from? Cloth.

8. Our clothes are made out of cloth. What is cloth made from? Cloth is made from . . . I don't know. (Let's think. How is cloth made?) From a factory. (Um hum. It probably is made in a factory--and how do they do it in that factory?) They probably have a big machine and it like just sews it all up.

9. Most cloth is made by weaving it from threads. Where do threads come from? . . . I don't know.

3. **Mike** (high SES, high achiever)

7. What are our clothes made from? Cotton . . . wool, flax, . . . (What do we call this material that clothes are made out of?) Clothing. (Cloth or fabric.)

8. Our clothes are made from cloth. What is cloth made from? Fur from animals. (How is cotton made into cloth?) It's spun and then it turns into string and then it's woven. (Where do we get cotton?) It comes from a plant. (What do they do next with it?) They put it in a big thing and they spin it and it turns into string. (What's happening when they spin it?) It's all twisting together and so it turns into string. (You say they weave it. What's happening there?) They're putting strings beneath and on top of each other to stay together to make it so there aren't holes in them. (How is wool made into cloth?) Wool is usually sheared from a sheep and then they dye it and then they weave it . . . or they spin it usually and it turns into a string. (What do they do with the string?) They weave it and make it into cloth. (How is flax made into clothes?) It comes from a plant and they take it off the plant and do the same thing with it. (How is fur made into cloth?) Fur is usually spun after it's cut off the animal.

9. Most cloth is made by weaving it from threads. Where do threads come from?
(See Question 8)

D. Third Grade Students

1. **Jason** (low SES, low achiever)

7. What are our clothes made from? Wool and yarn--a whole bunch of stuff. (What do we call this material that clothes are made out of--a general term?) String, yarn . . . stuff.

8. Our clothes are made out of cloth. What is cloth made from? (How is wool made into cloth?) A machine. (Where is the wool from?) A lamb. (What do they do? How does it get from the lamb to a machine?) They cut it and it goes in a truck. (Then what do they do with it?) Take it to a machine. (What does the machine do?) It sews it together. (How does it sew it together?) I don't know. (How is cloth made?) I don't know.

9. Most cloth is made by weaving it from threads. Where do threads come from? I don't know. (How do they make the thread?) Little pieces of string. (What do they do with little pieces of string?) I don't know. (How is thread made from wool?) I don't know that.

2. **Kevin** (average SES, average achiever)

7. What are our clothes made from? Silk, wool, cloth.

8. Our clothes are made from cloth. What is cloth made out of? Spider webs and . . . that's all. (Well, how is cloth made out of spider webs?) You take the webs and give it to a factory, then they change it to cloth or silk.

9. Most cloth is made by weaving it from threads. Where do threads come from? Sheep. (OK, you mean the sheep's wool.) Yeah, their wool. (OK, so then, how does it come from the sheep's wool to this--the thread?) First the farmer shaves the wool off the sheep, then they give it to their wives, if they're old fashioned, and she'll spin the wool and it'll come out really skinny, and if they wanted different colors, they'd probably dye it.

3. **Carlie** (high SES, high achiever)

7. What are our clothes made from? Materials like silk or leather or just cotton.

8. Our clothes are made from cloth. What is cloth made from? Cloth or leather, not leather but cotton and stuff like that. (So how is cotton made into cloth?) They like sew with a needle and thread around cotton, kind of. Maybe they color it. I don't know. (I'm

not hearing what your saying.) I think they sew around it and then they put cotton inside it to make it soft and thicker or they color cotton and sew it.

9. Most cloth is made by weaving it from threads. Where do threads come from?

They have this machine that makes it--maybe it squishes it and makes it hard and tight and stuff, or they . . . I don't know. They twist cotton a lot.

Grade Level Differences

Statistical information for scores derived from Questions 7-9 is given in Tables 3 and 4. The tables indicate that 9 of the 20 variables derived from these questions showed a statistically significant relationship with grade level, and 8 of these showed expected grade progressions. For many of these categories, there was a large difference between the kindergarteners and the first graders, with smaller differences between the first graders and the older students.

Data for Question 7 indicate that kindergarteners were more likely than older students to be unable to say what clothes are made from. Older students were more likely to say that clothing is made from cloth (material, fabric, etc.), as well as to name particular kinds of cloth (silk, cotton, etc.) or to say that clothing is made from animal skin (wool, fur, leather).

Only three of the eight response categories for Question 8 showed significant relationships to grade level. The younger students were more likely to be unable to respond to this question as well as to respond incorrectly by stating that cloth is made from "other" material (wood, straw, paper, gel, spider webs, etc.). Older students were more likely to supply the correct response indicating that cloth is woven or knitted from thread or yarn. The remaining categories, indicating either incomplete knowledge or outright misconceptions, were not significantly related to grade level (or to SES or achievement level, except for one nonlinear relationship). Thus, there is no evidence of any stage-like progression from no ideas at all through one or more particular forms of misconception to ultimate correct understanding of the

nature of cloth. It is clear, however, that many children (probably the majority of those who do not understand that cloth is woven from threads) believe that cloth is a solid (although pliable) substance such as the thin leather, rubber, and plastics used to make certain forms of clothing.

The data for responses to Question 9 indicate that older students were more likely than young students to know that threads are spun from raw material (although only about 20% of even the second and third graders knew this). The category for “black box” responses, in which students indicated that threads are manufactured (typically, using machines) at stores or factories, showed a nonlinear relationship to grade level because it was coded less frequently for second graders than for students in the other grades. The remaining categories, indicating inability to respond to the question or responses involving various misconceptions, were unrelated to grade level. Again, although a great many misconceptions were evident, there is no stage-like developmental progression in the students’ ideas about the nature of thread.

Socioeconomic Status, Achievement Level, and Gender Differences

Analyses of the 20 categories shown in Tables 3 and 4 showed nine statistically significant relationships with grade level but only five with SES, eight with achievement level, and one with gender. One of the relationships with SES was nonlinear. The other four indicated that the higher SES students were more likely than the middle or lower SES students to say that cloth is made from animal skin, to know that cloth is woven or knitted from thread or yarn, to be able to generate a substantive response to Question 9, and to respond to that question by stating correctly that thread is spun from raw material.

Two of the eight statistically significant relationships with achievement level were nonlinear. The remaining six relationships indicated that higher achievers tended to provide

more sophisticated responses than lower achievers. In responding to Question 7, they were more likely to say that clothes are made from cloth or to name particular kinds of cloth (silk, cotton, etc.), but less likely to provide “other” (usually naïve and incorrect) explanations. In responding to Question 8, the lower achievers were more likely to be unable to respond to the question, whereas the higher achievers were more likely to state correctly that cloth is woven or knitted from thread or yarn. In responding to Question 9, the lower achievers were more likely to state incorrectly that threads are (or are made from) found materials such as hair or animal skin. The relationship between achievement level and the category for accurately stating that threads are spun from raw material was not strong enough to reach statistical significance. However, it is noteworthy that this explanation was supplied by only five low achievers, whereas it was given by 10 average achievers and 12 higher achievers.

The only statistically significant gender difference indicated that 11 girls but only 4 boys gave “other” explanations for where threads come from (e.g., feathers, paper, silk, wool, weaving). This difference is difficult to interpret because the category includes a mixture of clear misconceptions (e.g., feathers, paper) with responses that could be considered correct as far as they go (e.g., silk, wool).

In general, the older students knew more than the younger students about cloth and thread, and within grade, the higher SES and higher achieving students knew more than the lower SES and lower achieving students. In some respects, the responses are impressive. Concerning what clothes are made from, the 85 “cloth” responses and the 69 responses that named particular types of cloth could all be considered correct, along with at least some of the “animal skin” responses (especially those that mentioned wool). The 75 “thread, string, yarn, knitting, stitching” responses were less sophisticated but still not incorrect. Concerning what

cloth is made from, the 57 “weaving” responses are clearly correct, but in addition, the 24 “from thread” responses and at least some of the “animal or plant sources” responses were correct as far as they went. Still, only a fourth of the students described cloth as woven and only an eighth described thread as spun.

Relationships Among the Response Categories

In general, response categories that showed the clearest progressions with grade level tended to correlate with one another and with response categories from other parts of the interview that represented more sophisticated responses to the questions. Among the categories included in Tables 3 and 4, this sophistication pattern included statements that clothes are made from cloth, from wool or animal skin, or from silk, cotton, linen, polyester, denim, etc.; that cloth is manufactured by weaving; and that threads are manufactured by spinning raw material. More specific correlation clusters included the following.

Students who said that clothes are made from cloth were more likely than other students to include the following steps in describing the manufacture of a shirt: spinning thread, cutting pieces of cloth to form the major parts of the shirt, and stitching these parts together to form the complete garment. These students also were more likely than other students to talk about shoes being made from leather and to describe them as being made by sewing or assembling the parts together.

Students who said that clothes are made from yarn, thread, etc. were more likely than other students to repeat this statement when asked for details of the manufacture of cloth, as well as more likely to say that cloth is made by weaving and to include weaving the cloth as a step in manufacturing a shirt.

Students who said that clothes are made from wool or animal hide were more likely than other students to also say that they are made from silk, cotton, etc. Other correlated categories included stating that thread is spun from raw material; naming three or more steps in manufacturing a shirt; stating that shirts are manufactured in factories located near sources for raw materials; and stating that shoes are made from leather, explaining leather accurately, and talking about manufacturing shoes by sewing or assembling the parts together.

The categories that correlated with the statement that clothes are made from silk, cotton, etc. were mostly the same ones that correlated with the statement that clothes are made from wool or animal hide. However, students who said that clothes are made from silk, cotton, etc. also were more likely than other students to say that cloth is made by flattening solid material (e.g., fluffy cotton) rather than by weaving, to mention the sewing machine or other inventions in talking about reasons for the improvement of clothing over time, and to give “black box” explanations of shirt manufacture (e.g., they put it in a machine and it makes the shirt), again instead of talking about weaving.

Students who described cloth as woven from thread or yarn also were more likely than other students to describe thread as spun from raw material, to mention the sewing machine as an invention that has improved clothing over time, to include weaving the cloth as a step in shirt manufacture, to state that shirts are sewn at factories located near raw materials, and to give correct explanations of leather.

Students who said that clothes are made by stitching together (presumably solid) pieces of cloth were more likely than other students to say that clothing is made from wool or animal hide or from silk, cotton, etc. (but less likely to say that cloth is woven from thread or yarn).

Students who said that cloth is made by flattening solid raw materials (e.g., pressing fluffy cotton flat) were more likely than other students to say that clothes are made from silk, cotton, etc. and to give “black box” explanations for shirt manufacture. Otherwise, this “flattening” response showed occasional positive correlations with response categories that were part of the overall sophistication pattern. This suggests that this response, although incorrect, was a well-reasoned guess. Positive (although nonsignificant) trends toward relationships with grade level and achievement level support this interpretation.

Students who said that new clothes were made by recycling material from old clothes also were more likely than other students to say that thread is obtained by unraveling old clothes.

Students who said that cloth is made from thread or yarn in responding to Question 7 tended to make this same statement in responding to Question 8 (but without mentioning weaving).

Students who understood that thread is spun from raw material also were more likely than other students to say that clothing is made from wool or animal hide, to explain that cloth is woven from thread, to describe pioneer clothing as homemade, to mention the sewing machine as an important invention, to talk about spinning thread as a step in manufacturing a shirt, to know that shoes are made from leather, and to describe the key steps in manufacturing shoes.

Students who could say only that threads come from stores or factories later were more likely than other students to talk about processing raw material as a step in making a shirt and to say that shirts are made at factories.

In general, these correlational patterns indicate that students tended to be consistent across the interview in relying on certain key ideas as bases for their answers, whether or not these ideas were correct and whether they were vague or well articulated.

Rare and Unique Responses

The following responses to Questions 7-9 involve interesting elaborations on the ideas represented by the coding categories or embody ideas that are not included in those categories.

What are Clothes Made From?

Kindergarten: Rubber; trees, leaves, paper; velcro.

First grade: Steel (for protective clothing); buttons; pillow case, carpet, snakeskin and bearskin.

Second grade: Quilts (meaning bolts of cloth); straw.

Third grade: Rubber and silver; lace; from wool but not from sheep (unexplained further). One third grader described learning about silkworms at school from a movie about Japan or China.

What is Cloth Made From?

Kindergarten: Wood (2); tissue; spinning wheels are used to spin “cloth” into “sweaters;” feathers; pieces of cotton are sewn inside two pieces of “fabric” (unexplained further); paper (2); straw; cloth is raw silk that has been washed; trees; mentions spinning wool but thinks that this is to flatten it out and “make it into” cloth (nothing about weaving).

First grade: Plastic is used in some clothing; besides knitting, describes a process of flattening and softening material from trees; feathers, string; rubber, cotton forced into cloth through a hole and then sealed (like insulation); flatten string and stick it together; “sponge stuff” (feels like a sponge but isn’t). Finally, the following response from a first grader is quoted verbatim: (How is cotton made into cloth?) Maybe they take a machine and put tissue and a

little cloth in and they make them in this machine and the machine smishes them and then they paint it and it's made into cloth. (How is wool made into cloth?) They take it off the sheep and they take it to a place and then the parts that are real dirty, they take those parts off and then they put it in another machine and they smish it and while they're smishing it, it's turning bigger and bigger and bigger and they take it out and paint it and color it and everything.

Second grade: Yarn, trees; they use a kind of gel and liquid mixed together to make it thick, and then put it through a color machine; paper (reverses the idea of making paper from cloth); they spin raw wool to make clothes; clothes are made from wool (can't explain how).

Third grade: Carpet things; spider webs (perhaps thinking of silkworm cocoons); "cotton" is sewn inside of the cloth, to make it soft; explains weaving cloth from wool threads but also speaks of machines making clothes from plants, trees, or paper (within this student, more primitive concepts still coexisted alongside a more mature concept).

Several students spoke of attaching raw wool to a (woven) cloth substrate or sewing the wool in between two layers of cloth (like insulation). Others spoke of a cotton "pocket" inside cloth covers. Still others spoke of a cloth substrate covered over with layers of cotton, wool, etc. These responses came from students who did not understand that cloth is woven threads and were seeking to explain the relationship between raw wool or cotton (as they envisioned it) and fabric.

Many students spoke of "sewing" a garment from start to finish—like knitting a sweater (and maybe cutting out neck or arm holes)—as opposed to assembling cut pieces and then stitching them together. Some of the students who said that cloth is made from thread, yarn, etc. but were not able to explain how were probably working from this model.

Where Do Threads Come From?

Kindergarten: Use a shredder to shred rope into threads; iron the wool and then spread it out to make it soft; yarn; hay; rubber; they glue hair together; threads come from “the ground;” trees (2).

First grade: From animal fur (hairs) tied together using tiny knots; feathers, string; from trees and paper; cut tiny pieces of wool from sheep, then “smash” them at the store where the garment is made; machines separate thick from thin sheep hairs, then dye the thin ones for thread; raw wool is cut up into tiny pieces to make thread.

Second grade: Trees; somehow made from animals; made by silkworms; made from horse tails; made from yarn; they twist the wool, then cover it with cloth to make string; they roll it to make it small and thin; string; made from ropes on farms; made from strings found in hay; a machine pounds it to make it thin; threads come from human or animal hair. One second grader talked about learning about spinning in a unit on colonial days.

Third grade: String (6); pull out loose threads hanging from garments; sheep hairs are fused using heat or else tied together in tiny knots and silkworms produce silk threads; they take cotton and “pull the strings out of it;” they break (picked) cotton into little pieces; cotton is forced through a small hole to make thread; silk strings are made from horse tail hair; a machine “take the extra stuff off” that makes the wool too fluffy.

Discussion

Students’ responses to Questions 7-9 were much less knowledgeable than their responses to Questions 1-6. Thus, even though the students knew that clothing is a basic need and could talk about different kinds of clothing and why they are worn, most of them did not know what

clothing actually is (i.e., that most clothing is made from cloth that is woven from thread that is spun from raw material). Only 57 students understood that cloth is woven from thread, and fewer than half of even these students understood that thread is manufactured through a process of spinning. Lacking knowledge that cloth is woven, a majority of the students envisioned cloth as a solid membrane (i.e., animal skin) or manufactured substance (akin to plastic, rubber, or paper). Many of these students understood that thread is used in manufacturing clothing, because they understood that thread is used to stitch together pieces of cloth to form the garment. However, most of these students did not realize that the garment pieces themselves were woven from thread. These ideas sometimes were seen even in students who correctly stated that clothes are made from wool, silk, or cotton, because many of these students thought that these raw materials were processed for clothing manufacture by “smishing” them into flat cloth membranes or substances (rather than by spinning threads from them).

Some students who did not understand that cloth is woven from threads nevertheless did know that much clothing is made from wool or cotton. In attempting to describe clothing manufacture, these students sometimes depicted (presumably solid) pieces of wool or cotton being glued, sewn, or otherwise attached to a (presumably solid) cloth substrate. Among students who did understand that clothing is woven, some were confined to a “knitting” model in which the entire garment is woven/knitted in one continuous operation from beginning to end. The others articulated a “parts assembly” model in which patterns are used to cut pieces of woven cloth into shaped garment components and these components are then stitched together to form the complete garment.

Students who had no knowledge of “land to hand” relationships in obtaining thread from plant or animal sources and then weaving the thread into cloth were forced to develop alternative

explanations when asked where cloth and thread come from. Some of these students talked about gathering and processing naturally found material such as animal hair, whereas others talked about unraveling and reusing old clothing. One student interviewed prior to an implementation of our instructional unit on clothing (i.e., not one of the 213 students interviewed in this sample) carried the “recycling” notion even further by suggesting that clothing is made from lint collected from clothes dryers.

In summary, although responses to Questions 1-6 were generally knowledgeable and most responses to Question 7 gave an initial impression that students understood the basic nature of cloth and clothing, responses to Questions 8 and 9 made it clear that this was not the case. Even though almost 90% of the students answered Question 7 by saying that clothes are made from cloth, material, fabric, thread, yarn, wool, silk, cotton, etc., most were unable to explain key steps in clothing manufacture. Only 57 understood that cloth is woven, and only 27 understood that thread is spun.

Evolution in Clothing Over Time

Questions 10-12 focused on students’ knowledge about clothing in the past. Question 10 asked about clothing in prehistoric times, Question 11 about clothing in the 17th and 18th centuries, and Question 12 about clothing at the beginning of the 20th century.

10. Let’s talk about clothing in the past. Way back when people lived in caves—what kind of clothes did they wear? . . . What were their clothes made of? . . . Where did the pioneers get their clothes?

11. Back in the days of the Pilgrims and the pioneers, what kind of clothes did people wear? . . . What were these clothes made of? . . . Where did the pioneers get their clothes?

- 12. Back when your great-grandparents were children, what were people's clothes like?
... How were clothes back then different from today's clothes?**

These questions about clothing in the past were followed by other questions calling for comparisons with today's clothes. Question 13 asked about how today's clothes have been improved over clothes in the past and about inventions associated with these improvements, and Question 17 asked whether today's clothes are easier or harder to take care of than clothes in the past, and why.

- 13. How have today's clothes been improved over clothes in the past? ... Do you know about any inventions that have made clothes better than they used to be?**

- 17. Are clothes today easier or harder to take care of than they used to be? ... Why?**

Statistical information developed from students' responses to these questions is presented in Tables 5 and 6. Concerning cave dwellers' clothing, about 60% (130) of the students said that in prehistoric times people wore clothing fashioned from animal skins (not woven cloth). This response would be considered correct based both on scientific knowledge about clothing in prehistoric times and on depictions of cave dwellers shown in children's literature, comic books, and television programs such as Alley Oop or the Flintstones. Among the remaining students, 37 were unable to respond and 45 produced other responses such as that the people wore clothing made from woven cloth or from leaves or branches (perhaps the latter responses had been prompted by descriptions of Adam and Eve in biblical materials written for children).

Concerning Pilgrim and pioneer clothing, 66 students provided descriptions of Pilgrim clothing that conformed to conventional illustrations (men wearing black, gray, or green hats, pants, and coats over a white shirt, with a big buckle; women wearing long dresses, often with aprons, as well as bonnets or shawls). In addition, 54 students gave descriptions of pioneer

clothes that conformed to conventional illustrations (buckskin or leather outfits, homespun work or “farmer” clothes for men and dresses for women). An additional 31 students gave responses that didn’t conform to either the conventional Pilgrim or the conventional pioneer clothing stereotypes but could be considered at least partly correct (wool clothes, Indian clothes, ruffled shirts and coats, etc.).

Finally, 49 students were unable to respond to the question and 12 gave descriptions that were wholly or largely incorrect (Pilgrim or pioneer clothes were confined to animal skins and did not involve any woven cloth; clothes at that time were just like today’s clothes; they wore suits or uniforms). Of the 213 students, only slightly more than half (108) were able to supply conventional descriptions of either Pilgrim or pioneer clothing (including 12 students who accurately described both). Other, less informed responses were more accurate than comparable responses for cave dwellers, possibly because the questions addressed more recent times but probably because the students possessed more information about the Pilgrims and/or the pioneers than about prehistoric cave dwellers.

When asked how the pioneers got their clothes, only about one-third (74) of the students understood that pioneers along the frontier had to make all or most of their clothes themselves. Ninety students were unable to respond to the question, 35 thought that the pioneers bought all or most of their clothes from stores or traveling clothing merchants, and 14 thought that they made some and bought the rest (this also would be considered an accurate response).

When asked about clothing when their great-grandparents were children, 71 students could not respond but a majority of the rest (98) supplied generally accurate responses. These students stated or implied that most clothing at that time was woven from cloth rather than fashioned from animal skins, or perhaps said that the clothing was generally like ours but

heavier, less comfortable, drab for lack of modern dyes and design processes, etc. The remaining students generated responses that were incorrect because they stated that clothing at that time was just like today's clothes (21), described clothing from much earlier times (14), or were incorrect in some other, unique way (9).

More than 40% (93) of the students were unable to respond to the question about how today's clothes are improved over the clothes of the past. The remaining students provided one or more relevant responses, with the most popular (67) being statements that today's clothes are more aesthetically pleasing (more colorful, decorated with beads, designs, or pictures, etc.). Other observations included statements that today's clothes are more comfortable because they are less formal and include shorts and other play clothes (31), that we can select from a wide variety of good quality clothes (31), that today's clothes are lighter or softer because they are made with finer threads (20), that today's clothes are better at keeping us warm (15), and that today's clothes are more durable because they are sewn better or less likely to fall apart (14). A few students attributed our enjoyment of a wide variety of good quality clothing choices to mass production and other modern manufacturing inventions and techniques, but most simply noted this abundance of choices without attempting to explain it.

Students who viewed clothes of the early 20th century as more formal than ours may have been influenced by family photos or other photos taken in an era in which photographs were expensive so most people rarely had them taken and usually dressed formally when they did.

It is not clear why many students thought that the clothes of the past were poorly sewn and prone to unravel or fall apart easily. However, responses to all of our interviewed reveal a pervasive presentism in the students' ideas about the past. The students tend to believe that

modern artifacts are better in every way than those of the past (and more specifically, that things manufactured using machines are better than hand-made versions of the same items).

Only one-fourth of the students were able to name one or more inventions that led to the improvement of clothing. Most (40) of these students mentioned the sewing machine. In addition or instead, 26 students mentioned other inventions, such as spinning machines, looms, ironing or pressing machines, washers or dryers, or better needles or sheep-shearing equipment.

Concerning whether clothes are easier or harder to take care of today, 143 students provided the expected response by saying that clothes are easier to take care of today. However, 58 students said that clothes are harder to take care of today. These numbers included two students who said that clothes are easier to take care of in some respects but harder in others. Finally, 14 students were unable to respond to this question.

Among the minority of students who stated that clothes are harder to take care of today, two subgroups provided explanations that made their opinion understandable: 12 noted that we have more clothes today so it is harder to keep track of and take care of them, and 8 suggested that today's clothes are harder to keep clean than clothes of the past. The latter students were thinking of modern business clothes that are expected to be kept extremely clean (compared to what might have been expected of, for example, the pioneers), so this response is considered a valid one. Among the remaining students who said that today's clothes are harder to take care of than the clothes of the past, however, 15 were unable to explain their answer, 9 put forth the dubious proposition that modern machine washing and drying is harder or takes longer than handwashing and drying, and 15 supplied miscellaneous "other" explanations (mostly naïve or otherwise incorrect).

Of the 143 students who said that clothes are easier to take care of today than in the past, 92 were able to cite at least one valid reason to explain why this is so. A majority (51) of these cited modern clothes washers, dryers, or other labor-saving machines. In addition, 30 cited modern clothes hampers, hangers, closets, and other devices for storing clothing, 13 noted characteristics of modern fabrics that make clothing care easier (lighter fabrics are more foldable, wash-and-wear fabrics do not require ironing), and 27 students supplied miscellaneous “other” valid explanations (we can buy new clothes instead of continually having to mend old ones, office buildings and most other contemporary work environments do not get clothes as dirty as the pioneers’ farm work did, etc.). The remaining students either were unable to respond to the question (28) or made some statement that was correct but not germane to the issue of why today’s clothes are easier to take care of (e.g., stating that today’s clothes are easier to put on and take off).

The following examples are representative of the responses from students who varied across grade, SES, and achievement levels.

A. Kindergarten

1. **Lance** (low SES, low achiever):

10. Let’s talk about clothing in the past. Way back when people lived in caves—what kind of clothes did they wear? . . . What were their clothes made of? . . . Where did the pioneers get their clothes? [no response]

11. What about pioneers? How did they get their clothing? By making them.

12. Back when your great-grandparents were children, what were people’s clothes like? Like white. (How were clothes back then different from our clothes today?) Because there might not be anybody in them.

13. How have today’s clothes been improved over clothes in the past? I don’t know.

17. Are clothes today easier or harder to take care of than they used to be? [no response]

2. Denise (average SES, average achiever)

10. Let's talk about clothing in the past. Way back when people lived in caves—what kind of clothes did they wear? I don't know.

11. Back in the days of the Pilgrims and pioneers, what kind of clothes did people wear? Different kind of clothes. They have white hats. I don't know anything else. (What were those clothes made out of?) I don't know. (Where did they get their clothes?) Probably just made them.

12. Back when your great-grandparents were children, what were people's clothes like? Different. (How were they different?) I don't know.

13. How have today's clothes been improved over clothes in the past? I don't know. (Do you think the clothes we wear today are better than they used to be?) Yeah. (How are they better?) Cause they look gooder. (All right. Do you know of any invention that has made clothes better than they used to be?) No. I know how they make white stuff from lambs.

17. Are clothes today easier or harder to take care of than they used to be? Harder to take care of. (Now they're harder? What makes them harder to take care of now?) If they get all dirty, the dirt can't come off.

3. Luke (high SES, high achiever)

10. Let's talk about clothing in the past. Way back when people lived in caves, what kind of clothes did they wear? They wore like animal skin. (How did they make these animal skins into clothes?) They killed the animal and they cut it. (How did they keep it together?) Well, sometimes you can use elastic. (Is that what they used?) No. (Do you know how they kept them together?) No.

11. Back in the days of the Pilgrims and the pioneers, what kind of clothes did people wear? They wore like hats and they wore . . . I don't know. (What were these clothes made of?) I don't know. (Where did the pioneers get their clothes?) They had to sew them. (Any other places they could get them?) No.

12. Back when your great-grandparents were children, what were people's clothes like? I don't know. (How were clothes back then different from today's clothes?) I don't know.

13. How have today's clothes been improved over clothes in the past? Um . . . I don't know. (Do you know about any inventions that have made clothes better than they used to be?) No. (Anything that has made clothes better?) No.

17. Are clothes today easier or harder to take care of than they used to be? Easier. (Why?) I don't know.

A. First Grade Students

1. Heidi (low SES, low achiever)

10. Let's talk about clothing in the past. Way back when people lived in caves—what kind of clothes did they wear? They wore cave clothes. They only had one shoulder strap and then they have clothes that probably are made out of this stuff. (What is this stuff?) Cat hair. (You think their clothes were made out of cat hair? Were they made out of anything else?) All different sorts of cats and that's all I know.[This response may have been prompted by frequent references to calico and angora in children's literature.] (How did they make their clothing?) With yarn and threads and needles and with their needles they can get the thread through.

11. Back in the days of the Pilgrims and the pioneers, what kind of clothes did people wear? I don't know.

12. Back when your great-grandparents were children, what were people's clothes like? Maybe like ours but I don't know.

13. How have today's clothes been improved over clothes in the past? I can't figure that one out.

17. Are clothes today easier or harder to take care of than they used to be? Harder to take care of. (Why do you think they're harder today?) I don't know.

2. James (average SES, average achiever)

10. Let's talk about clothing in the past. Way back when people lived in caves—what kind of clothes did they wear? Probably they just had to cut off a tooth from a saber tooth tiger and then they go up to some animal that has fur, like a mouse, they could cut off their fur and then they wrapped it and then they cut off another part of it and then they wrapped it around, but way back then, they didn't have stuff to hook it together so they took some bones and they curl it so the bone will hook the clothes together.

11. Back in the days of the Pilgrims and the pioneers, what kind of clothes did people wear? The Indians wear just these clothes and the Pilgrims--they wore these . . . the girls had these two things tied back there and it made a hat and then they walked around with these clothes with red stripes . . . the owner, he took some of those Pilgrims and made them into slaves and then he made the slaves make clothes. (So where did the pioneers get their clothes?) They get the clothes like from the prisoners [slaves]. (The pioneers are the people who settled in the west. We see picture of pioneers going out west to new land in their covered wagons. What do you think they wore?) They wore

probably like stuff, like important clothes. (Where do you think they got their clothes?) Probably they got their clothes from fur cloth too.

12. Back when your great-grandparents were children, what were people's clothes like? I don't know but they probably were like mixed up like blue jeans weren't blue--they were red, and they looked . . . my mom once gave me these pants that my dad wore when he was a kid and they were red so I think they just got their pants turned red. (Do you know of any other differences between the clothes that we wear today and clothes they wore back then?) Yeah, their pants were red and our pants or blue jeans are blue. And the clothes were just different. That was a long time ago, and now is now and they make our clothes like this.

13. How have today's clothes been improved over clothes in the past? Like kids' clothes back in the past, their clothes had to be fancy and nice. But in our times, they made our clothes kind of nice. (Do you know about any inventions that have made clothes better than they used to be?) I think a long time ago there wasn't anything where you make cloth. Now there is stuff to make cloth.

17. Are clothes today easier or harder to take care of than they used to be? Easier, cause a long time ago, like when there was those people, probably they just had one clothes and they would get teared off or something, but now we have a lot of clothes and we can put our dirty clothes downstairs to get washed and put our clean clothes in a dresser so they'll be safe.

3. Anna (high SES, high achiever)

10. Let's talk about clothing in the past. Way back when people lived in caves—what kind of clothes did they wear? They had shoulder straps and they had this shirt that was covered with orange, and they didn't have any shoes back then. (What were these clothes made out of?) Cloth. (How did they make the clothing?) They tried to weave it.

11. Back in the days of the Pilgrims and the pioneers, what kind of clothes did people wear? Dresses, shirts, sometimes pants. (What were these clothes made of?) Scraps and cloth. (Where did the pioneers get their clothing?) Um . . . from . . . sometimes paper scraps.

12. Back when your great-grandparents were children, what were people's clothes like? Sometimes they wore dresses and they wore some kind of shirts--I forgot the name of them, and they wore these pants. (How were their clothes different from our clothes today?) They didn't have any color, and . . . they didn't have belts to hold them up with.

13. How have today's clothes been improved over clothes in the past? Because they have more color and different shapes and bigger sizes. (Do you know about any inventions that have made clothes better than they used to be?) Inventions? No.

17. Are clothes today easier or harder to take care of than they used to be? Easier. (Why do you think that?) Because we didn't have to go near a lake to wash them and if we wanted to let them go, they wouldn't go anywhere. (What do you mean "if we wanted to let go, they wouldn't go anywhere?") Like if you put them in the lake. (Oh, I see. In the lake the clothes might float away from you.)

B. Second Grade Students

1. David (low SES, low achiever)

10. Let's talk about clothing in the past. Way back when people lived in caves—what kind of clothes did they wear? Animal clothing in the caves. They kill animals and skin them. (OK. Well, then, how did they make their clothes out of animal skins?) They had to let the blood and stuff dry, and they had to wash that in the river. (So then they washed the skins in the river. Then what?) At sun up, they put it right there laying down and let it dry and dry and they had to make sleeves out of stuff, like if you wanted one that had a hood on it, they had to make that, but you had to kill a lot of animals to make all that.

11. Back in the days of the Pilgrims and the pioneers, what kind of clothing did people wear? Um . . . like real fancy clothes. (What were these fancy clothes made out of?) I don't know. (Where did the pioneers get their clothes?) From animals.

12. Back when your great-grandparents were children, what were people's clothes like? They wasn't new. You had to make them. If you had a sewing machine, you could sew it up with a sewing machine. (How were clothes back then different from today's clothes?) Theirs was kind of dressed up.

13. How have today's clothes been improved over clothes in the past? They was different from ours. (Do you know about any inventions that have made clothes better than they used to be?) No.

17. Are clothes today easier or harder to take care of than they used to be? Harder. (Why do you think so?) You have to wash them every time with kids, and now it's warming up and they're going to be outside running around and getting dirty.

2. Tanya (average SES, average achiever)

10. Let's talk about clothing in the past. Way back when people lived in caves—what kind of clothes did they wear? They wore skins from animals. (How did they make the skins into clothes?) They killed the animals and cut off their fur and made clothes with them.

11. Back in the days of the Pilgrims and the pioneers, what kind of clothes did people wear? They wore dresses and pants just like we do. (Where did they get their clothes—the pioneers? Where did they get their clothes?) They made them. (What do you think they made them out of?) [no response]

12. Back when your great-grandparents were children, what were people's clothes like? Just like ours. (There were no differences between their clothes and what we wear today?) The girls always had to wear dresses and the boys always had to wear pants.

13. How have today's clothes been improved over clothes in the past? They're warmer than the others. (Are there any other differences?) No. (Are there any inventions that you know of that have made clothes better than they used to be?) No.

17. Are clothes today easier or harder to take care of than they used to be? Easier. (Why do you say that?) Because we have like . . . [no further response]

3. Mike (high SES, high achiever)

10. Let's talk about clothing in the past. Way back when people lived in caves, what kind of clothes did they wear? They wore animal fur and they wrapped it around or did something with it to make it stay on.

11. Back in the days of the Pilgrims and the pioneers, what kind of clothes did people wear? Indians wore . . . the girls wore dresses and the men usually wore . . . I don't know. (What did the pioneers and the Pilgrims wear?) The men would wear pants and a shirt and the women would probably wear a dress. (What were these clothes made of?) They were made out of the things they could find or that the Indians gave to them. (Where did the pioneers get their clothes?) They got them from animals or plants, things like that.

12. Back when your great-grandparents were children, what were people's clothes like? They were . . . probably pants and a shirt. Skirts. (How were clothes back then different from today's clothes?) Today's clothes are more like . . . they have pictures on them but a long time ago, they were usually just one color. (Any other ways they're different?) We have different colors now.

13. How have today's clothes been improved over clothes in the past? They're more strong, they're more comfortable maybe. (Do you know about any inventions that have made clothes better than they used to be?) No.

17. Are clothes today easier or harder to take care of than they used to be? Easier. (Why?) You just take your clothes off and put them where the laundry is and wash them and you can wear them again. (And in the past could they do that?) Well, they could but it would be harder to wash them.

D. Third Grade Students

1. Jason (low SES, low achiever)

10. Let's talk about clothing in the past. Way back when people lived in caves, what kind of clothes did they wear? Skins. (How did they make the skins into clothes?) I don't know.

11. Back in the days of the Pilgrims and the pioneers, what kind of clothes did people wear? I don't know. (What were these clothes made of?) I don't know. (Where did the pioneers get their clothes?) Animals. (So you think their clothes are made out of animal skins?) Yeah. (Were their clothes made out of other things too?) String.

12. Back when your great-grandparents were children, what were people's clothes like? Ours. (Just like ours. How were clothes back then different from today's clothes?) I don't know.

13. How have today's clothes been improved over clothes in the past? Different styles. (Can you tell me a style that's changed--that's different than it used to be?) No. (Do you know about any inventions that have made clothes better than they used to be?) No.

17. Are clothes today easier or harder to take care of than they used to be? Easier. (Why?) I don't know.

2. Kevin (average SES, average achiever)

10. Let's talk about clothing in the past. Way back when people lived in caves—what kind of clothes did they wear? Animal skins and . . . that's all. (How did they make the animal skins into clothes?) They probably took something sharp, like an arrow, and shot the animal and killed it and brung it to their cave and took something sharp and put it out like they wore back in the old times.

11. Back in the days of the Pilgrims and the pioneers, what kind of clothes did people wear? Some of them wore shoes--some didn't, probably cause they couldn't afford it--long socks, short pants, and a shirt and--this is for boys--and a little hat, not today's hat. (What were these clothes made of?) Probably sheep or something. (Where did the pioneers get their clothes?) Probably they make them for their own self, the people that can't afford it, and probably some other people bought it from people. (Do you have any idea where they'd get the fabric to make them?) Wool from sheeps.

12. Back when your great-grandparents were children, what were people's clothes like? Probably the same, like the Pilgrims. Yeah. (How were clothes back then different from today's clothes?) We got short socks and they still had long socks and now we have new hats like basketball hats and baseball and football, and back in the old

times, they just had brown hats, nothing like today. Plus, we got shorts and they just had long pants and we've got different colored pants and they just had one color of pants, like that.

13. How have today's clothes been improved over clothes in the past? Color. (Any other improvements?) Nope. (Do you know about any inventions that have made clothes better than they used to be?) No.

17. Are today's clothes easier or harder to take care of than they used to be? Easier. (Why do you say that?) Because we got like machines, like washers and we can just throw them in there and just wash them, and back in the old times it would take like one hour just to get the dirt out and get it clean--the clothes. That's why I think it's easier.

3. Carlie (high SES, high achiever)

10. Let's talk about clothing in the past. Way back when people lived in caves, what kind of clothes did they wear? I don't know. Maybe just kind of like clothes they wear in Africa. They just take clothes and wrap it around them maybe. (What are these clothes made out of?) Skin from animals. (Well, how would they make skin from animals into clothes?) They get an animal and they shoot it and then they take all their skin off and clean it and then just wrap it around them.

11. Back in the days of the Pilgrims and the pioneers, what kind of clothes did people wear? The ladies always wore dresses. They never wore pants, and the boys just wore like overalls and short jean pants and then just a shirt. (What were these clothes made out of?) I don't know. (Where did the pioneers get their clothes? The pioneers were the people who traveled west in covered wagons.) You mean what are they made out of? (Well, where did they get their clothes?) At stores, like markets or the ladies made them.

12. Back when your great-grandparents were children, what were people's clothes like? Shorts, I guess, and some people wore pants and a shirt-- like a white shirt and some brown pants and then the girls wore a long dress. (How were clothes back then different from today's clothes?) The men now have some different kinds of clothes like with more designs and not just white shirts, and not just brown pants. They have jeans and stuff now, and the girls don't have to wear dresses. Now they can wear shorts and pants, too.

13. How have today's clothes been improved over clothes in the past? Just kind of like what I said before. Girls have shorts now, and back then they could only have dresses--and boys have jeans. (Do you know of any inventions that have made clothes better than they used to be?) Maybe a sewing machine.

17. Are clothes today easier or harder to take care of than they used to be? Probably easier. (Why do you think that?) Back then they had them made out of skin and skin can break very easily.

Grade Level Differences

Data in Tables 5 and 6 indicate that 11 of the 18 coding categories derived from responses to Questions 10-12 showed a statistically significant relationship with grade level. Each of these showed the expected progression, although differences often were especially notable between the kindergarten students and the students in the other three grades. For each question, more younger students were unable to respond and more older students supplied correct responses. None of the incorrect responses showed significant relationships with grade level.

All 10 of the categories derived from responses to Question 13 showed a statistically significant relationship with grade level. Again, each of these showed the expected progression, with more younger students unable to respond and more older students supplying valid responses.

Responses to Question 17 were less closely related to grade level, with statistically significant relationships appearing for only 4 of 16 response categories. In particular, there was no significant relationship between grade level and the students' initial response to Question 17. That is, older students were not significantly more likely than younger students to say that it is easier to take care of clothes today. However, regardless of which way they answered this initial question, older students were more likely to be able to provide some explanation for their response. Also, if they were among the majority who said that clothes are easier to take care of today, older students were more likely to mention washers, dryers, or other labor-saving machines.

Socioeconomic Status, Achievement Level, and Gender Differences

Whereas 11 of the 18 response categories for Questions 10-12 showed significant relationships with grade level, the corresponding numbers were only 6 for SES level, 6 for achievement level, and 2 for gender. Higher SES students were more likely than other students to correctly describe the clothing of pioneers and clothing when their great-grandparents were children. These high SES students were also less likely than other students to provide only partly correct depictions of Pilgrim or pioneer clothes and to err by reaching too far back in time when describing clothing when their great-grandparents were children. The other two significant relationships with SES were nonlinear ones indicating that students in the middle SES group were less likely than students in the other two groups to accurately describe both Pilgrim and pioneer clothes and to suggest that the pioneers made some of their clothes but bought other clothes.

The six significant relationships with achievement level all indicated more, or more accurate, knowledge among higher achieving than among lower achieving students. Higher achievers were more likely to accurately describe cave dwellers' clothes, Pilgrims' clothes, and clothes when their great-grandparents were children. Lower achieving students were more likely to provide "other" (largely or completely incorrect) descriptions of cave dwellers' clothes, to be unable to respond to the question about clothes when their great-grandparents were children, and to supply miscellaneous "other" incorrect descriptions of these clothes.

The two gender differences indicated that 74 boys but only 56 girls supplied the conventional description of cave dwellers' clothes, whereas 10 girls but only 4 boys said that the pioneers made some of their clothes and purchased the rest. Neither of these differences was

predicted, although it might have been expected that boys would know more about cave dwellers and girls more about pioneers (or at least, more about their clothing).

Whereas all 10 of the response categories for Question 13 showed significant relationships with grade level, the corresponding numbers were only two for SES level, two for achievement level, and none for gender. The significant relationships with SES and achievement level were for the same two categories: Higher SES and higher achieving students were less often unable to respond to the question about how today's clothes are improved over clothes of the past, and more likely to respond by saying that today's clothes are more aesthetically pleasing.

We have noted that only four of the 16 coding categories for responses to Question 17 showed significant relationships with grade level. This pattern persisted for the other subgroup comparisons: There were only four significant relationships with SES level, two with achievement, and none with gender. Lower SES students were more likely to say that clothes are harder to take care of today, whereas higher SES students were more likely to say that clothes are easier to take care of today and to cite washers, dryers, or other labor-saving devices in explaining their answers. Higher SES students also were more likely to make correct statements that were not germane to the question, such as to note that today's clothes are easier to put on and take off.

Lower achieving students were more likely to be unable to respond to Question 17. In addition, among the students who said that clothes are easier to take care of today, higher achievers were more likely than lower achievers to talk about fabrics that are lighter and more foldable or do not require ironing.

The lack of significant gender differences in responses to Questions 13 and 17 is mildly surprising. Many would predict that girls' responses to these questions would be more knowledgeable, based on assumptions about girls' greater interest in or knowledge about clothing.

Relationships Among the Response Categories

Once again, the categories that showed the clearest progressions with grade level tended to correlate with one another and with categories from other parts of the interview that represented more sophisticated responses to the questions. Among the categories included in Tables 5 and 6, this sophistication pattern included statements that cave dwellers wore clothes fashioned from animal skins, conventional descriptions of Pilgrim and pioneer clothes, statements that the pioneers made at least some of their clothes, accurate descriptions of clothes when their great-grandparents were children, accurate statements about improvements in clothing (especially, noting that today we enjoy a much greater variety of choices), naming sewing machines or other inventions that have improved clothing, statements that clothes are harder to take care of today because we have more clothes than people did in the past, and statements that clothes are easier to take care of today because of modern machines.

There were some interesting contrasts in the correlation patterns for descriptions of Pilgrim vs. pioneer clothes. Students who accurately described Pilgrim clothes were more likely than other students to say that modern clothes are improved because they are warmer or more comfortable. In contrast, students who accurately described pioneer clothes were more likely to say that modern clothes are improved because they are more aesthetically pleasing and because light, soft fabrics make them easy to fold and store. Thus, the students tended to view Pilgrim

clothes as aesthetically acceptable but uncomfortable and ineffective at keeping people warm, whereas they viewed pioneer clothes as effective in keeping people warm but heavy, bulky, and not aesthetically pleasing.

Students who accurately described pioneer clothes were more likely than other students to say that today's clothes are made from wool or animal hide and to describe a process of "smishing" or flattening raw material.

Students who said that all or at least most pioneer clothing was homemade tended to talk about the great variety of choices available today as one way in which clothing has improved from the past, as well as to state that their own clothes were made at a factory.

Students who said that today's clothes are improved because they are more aesthetically pleasing were more likely than other students to describe clothing when their great-grandparents were children as drab and colorless, to include dying the cloth when talking about processes in manufacturing clothes, and to mention the appearance of the shirt or the fact that the shirt "looks good on me" as a reason for why they would purchase a particular shirt. However, these students were not more likely than other students to mention looking good or decoration as reasons for wearing clothing or to mention the color, design/print, or style of a shirt as a reason for buying it. Thus, an aesthetics theme was observable in certain students' responses, but this theme was not as strong or extensive as it might have been.

Students who said that clothing today is better at keeping us warm were more likely than other students to list protection against cold as a reason for wearing clothing and to contrast the clothing worn by people who live in contrasting climates in explaining why people who live in different places dress differently.

Students who said that today's clothes are more comfortable were more likely than other students to describe business clothes as formal clothes and to provide conventional descriptions of Pilgrim clothes (which they apparently viewed as uncomfortable).

Students who said that today's clothes are made from lighter, softer fabrics were more likely than other students to identify sewing machines or other inventions that have led to improvements in clothing and to include the nature of the fabric (typically, emphasizing a soft feel) as a reason for buying a shirt.

Students who said that we enjoy a much greater variety of choices today were more likely than other students to mention sewing machines or other inventions that have improved clothing, to say that their own clothes were made at a factory, and to say that their own shirt could have been made anywhere because clothes are made everywhere.

Students who said that today's clothes are sewn better and less likely to fall apart were more likely than other students to mention sewing machines or other inventions that have improved clothing, as well as to talk about the nature of the fabric or to say that the garment was of high quality or well made in explaining why they would buy a particular shirt.

Students who identified sewing machines or other inventions that have improved clothing were more likely than other students to know that cloth is woven thread and that thread is spun from raw material, to say that today's clothes are better because they are sewn better and less likely to fall apart, to say that their own clothes were made at a factory, and to say that they would buy a shirt that was well made or of high quality.

Rare and Unique Responses

The following responses to Questions 10-13 and 17 involve interesting elaborations on the ideas represented by the coding categories or embody ideas not included in those categories.

What Did Cave Dwellers Wear?

Kindergarten: The same clothes as we wear today (2); clothes made from thread/cloth (3); string; clothes made from “soft rocks” and material, using a design pattern; cloth made from moss; velcro; they didn’t wear clothes; they didn’t know how to make clothes; describes miners’ or cave explorers’ clothes; clothes made from sheets. In addition, one kindergartener thought that cave people had sewing machines.

First grade: Clothes made from cloth (6); clothes made from leaves or dinosaur skin; clothes bought in stores; clothes cut with scissors from curtains; Alley Oop clothes made from rocks or rugs; clothes made of leaves or rock; silk dresses and skirts.

Second grade: The same clothes as we wear today (2); old clothes made from yarn; pine needles and animal hair used as needles and threads; dirty clothes (because caves are dirty); they grew fur for clothes (student claims to have read this in a book about dinosaurs); “goat and stuff” (unexplained); clothes made from leaves and branches; clothes sewn from string and cloth; clothes made from wool (with the pieces “knitted” together); clothes made from leaves and moss; clothes made from leaves and straw.

Third grade: Cloth robes; they made dresses out of leaves; sewn togas; clothes sewn from cloth or bought; the girls had to wear lacy dresses; feathers, rocks, cotton shirts; cloth clothes; some clothes were made from leaves.

Pilgrim and Pioneer Clothes

Kindergarten: Uniforms bought at J.C. Penney; old clothes they got from a dump; the same as our clothes today (3).

First grade: Plainer clothes but just like ours; pioneers made clothes out of junk found in rivers.

Second grade: Fancy clothes, made from animals; girls wore old dresses and the boys wore clothing like uniforms, but older; long pants, shorts, suspenders; uniforms and guns like police (thinking of U.S. Army soldiers); dresses and pants like ours; made from cloth and leather; mostly casual stuff; raggy clothes. Several students noted that pioneer women made the clothes.

Third grade: Clothes like ours today (4); pioneers got their clothes “from animals;” they made them from tree bark; “outfits” that they made themselves; some animal skins and some cloth; the women wore dresses.

How Did the Pioneers Get Their Clothes?

Kindergarten: Indians gave their old clothes to the pioneers.

First grade: They made work clothes from wood; they had no money, so people must have given them clothes; their clothes were made by slaves. In addition, one first grader initially said that maybe Indians taught the Pilgrims how to make their clothes out of acorns, string, and newspaper, then said that the pioneers always wore black clothes which they got from “the animals and trees and leather and wool and maybe they learned how to make it out of bark.”

Second grade: They made them or got them from the Indians (3); they bought cloth at stores and then made their own clothes; they brought clothes from London, where they were

from; they brought the clothes with them on the Mayflower. In addition, one second grader thought that the pioneers used sewing machines.

Third grade: They got clothes from the Indians (3); they got clothes from animals (2); they would buy or trade for cloth, then use that to make their clothes (3); they got their clothes by picking cotton from the cotton fields; they brought them from England or got used clothes from people who didn't need them; they bought clothes from "a farmer" who made them; pioneer women made clothes from cotton and polyester.

Clothes When Great-Grandparents Were Children

Kindergarten: They made clothes using windmills instead of needles; they put on clothes differently then—they were made differently.

First grade: (none).

Second grade: Clothes were mostly homemade then (2); their clothes were fancier than ours (2); people were poor then, so they had no clothes; clothes were the same as now except that they had bell bottoms then; boys had to wear pants, girls had to wear dresses; clothes were mostly handmade because there were no machines then; they wore rags; cowboy outfits and uniforms; boys and girls had to follow stricter codes about what they could wear; they didn't use machines—they didn't want to waste time making machines, so they wasted time working on clothes instead.

Third grade: Bell bottoms (4); shaggy clothes; our clothes are sewn together better so they don't come apart; raggy clothes, all homemade; raggedy—they didn't have much money then, or enough cloth to be able to add designs to the basic garment; clothes were made better

and more carefully then, by hand or using just small machines; girls could only wear dresses then, no pants.

How Are Today's Clothes Improved Over Clothes from the Past?

Kindergarten: Our grandparents had to wear old-fashioned, dirty/raggedy clothes; they didn't have turtlenecks then, or rubber to make rubber items.

First grade: Our clothes are sewn better and don't come apart easily; there are "no holes and stuff" in today's clothes; ours are made from feathers; they had sweaters or something, we have long pants and skirts; they wore "old" clothes, ours are washed more; clothes are more reliable now due to machines and patterns; we have belts.

Second grade: Ours don't have fancy stuff on them; ours are stronger and better made and we have different clothes for each season; girls can now wear pants or whatever they want, not just hoop skirts; our clothes are nicer—not ragged like pioneer clothes, and we also have business clothes; we have better shoes, made out of leather rather than softer animal skins; some of our clothes are waterproof; our clothes are tested for safety and freedom from ants and bugs; our clothes are stronger, made using machines; our clothes are less itchy; our clothes are cleaner, neater, fancier (note contrast with other students who think that older clothes were fancier); our clothes are stronger and waterproof; our clothes are better cleaned and cared for; "knitting women" or "knitting clubs" make better clothes today; our clothes are more varied, stylish, and expensive; new materials have been discovered; we now have sturdier threads for making stronger clothes; today's clothes are stronger; today's clothes are sturdier and the seams don't break as easily.

Third grade: We have different styles today; then, girls had to wear dresses, no shorts; we don't have to wear as many clothes to keep warm (ours are better insulated); today we have sizes for better fits; our clothes are made better using better material; we have cooler clothes for hot weather; today's clothes are stronger; our clothes are made better, yet cheaper; our clothes don't tear as easily; better material (3); girls don't have to wear just dresses now.

What Inventions Have Made Clothes Better?

Kindergarten: New fabrics; better needles.

First grade: Manufactured threads (that allow for softer clothes); machines that "make clothes smooth and design them and everything;" patterns that make for more reliable/standard/symmetric clothes; better needles; clothing factories.

Second grade: Machines that press wool into cloth; padded shoulders and machines that add plastic trim and designs.

Third grade: Stirrup pants for women; dyes; bright colors; buttons instead of hooks; ties (because they make you look better); back then, boys had to wear uniforms and girls had to wear dresses; crochet hooks and knitting needles; needles; clothing factories; raincoats and reversible clothes that come in one color on one side and a different color on the other side; modern spinning machines and sheep shearers; better needles; better machines for making clothes (2).

Why Are Clothes Harder to Take Care of Today?

Kindergarten: We get clothes dirtier today (unexplained); you gotta put them in a pan and flip them like pizzas so they will dry out; harder to clean them today with all of the stuff they have out (unexplained); because "we always get them dirty sometimes;" because if they get

dirty, the dirt can't come off (unexplained); we wash our clothes more often than they used to; because workers work hard in their clothes and get them sweaty; because today's elaborately decorated shirts are harder to care for than the plain shirts of the past.

First grade: Because people have to work hard and do a lot of stuff, and sometimes clothes rip; today's white shirts are harder to keep clean than the earlier brown or black shirts; we have to button and button, but the cave men could just slip on their clothes; today we have to wash them and take care of them so they won't break; because people work and can't wash them quickly; it's harder to make fabric than it was to get and use animal hides (2).

Second grade: You have to wash them every time, especially with kids who get dirty; it's harder today because we have different colors but their clothes were not very bright; we have to wash our (fabric) clothes, but Indians didn't have to wash their animal-skin clothes; our light-colored clothes are harder to keep clean and free of spots; today we have to wash, iron, and hang up clothes to dry but they didn't have to do this in the past (2); today we are expected to keep clothes clean but in the past they just kept wearing them.

Third grade: If you don't have a nice job, you can't earn money to buy clothes if you get your clothes dirty; today we get dirty working or playing, but back then they didn't have much room to play, so they didn't get dirty; today we have many more different kinds of food that create more different kinds of stains, and some of them are harder to get out; some modern fabrics require special care (cannot be machine washed, must be handled carefully, etc.); today we have to wash, iron, etc., but in the past they didn't have to do those things (2)

Why Are Clothes Easier to Take Care of Today?

Kindergarten: Today's clothes look nicer; today's clothes "don't fall" (unexplained); we have hangers; our clothes are easier to get stains off of—they are slippery, so stains can slide right off of them easily in water; our clothes are easier to get on and off of your body (2); they get washed and they get dirty (unexplained); it is faster to make clothes on sewing machines and you don't play in your best clothes; fewer people go out on the roads now, so people don't rip up their clothes as much; kids take care of their own clothes now; we have zippers instead of buttons; they used to wear more layers or more clothes than we do; they had to make their own clothes but we can buy them.

First grade: We have short-sleeved shirts (easier to take care of than long-sleeved shirts); we learned how to fold clothes (thinks that they didn't know how to do this in the past); Indians had to hunt to get their clothes, but we can just shop for them; we have sewing machines to repair rips; we have washers and sewing machines and we can buy new clothes instead of constantly repairing old ones; they didn't have soap; they had to go find animals to get clothes; they had to make their own clothes; they had to work harder in the old days; our clothes are easier to get on and off. In addition, one student talked about old hand-cranked wringers on washers seen on a trip to Mackinac Island and noted that these were much harder to use than today's washers and dryers.

Second grade: Our clothes are better made, so you don't have to be so careful to avoid having them come apart; in Little House on the Prairie, Laura had to keep even her not-so-nice clothes clean and not torn; pioneers had to make their clothes while sitting in bumpy wagons, but today we sit on stable seats; today's clothes are made by machine (says nothing about caring for clothes); our clothes don't rip or tear so easily, so we don't have to spend much time mending

them; our clothes have tags that tell us how to wash them; today we walk slower and don't keep falling down and getting holes in our clothes; back then they were all farmers who got dirty and sweaty every day; colonials only had a few outfits, so they had to care for them almost constantly; we have lots of play clothes and don't have to worry so much about getting them dirty as people did back when they had only a few outfits; our clothes are easier to get on and off.

Third grade: Our clothes are smaller than the bell bottoms they used to wear; "no offense, but those black people on that show on TV, they don't have anything to put their clothes in, and hardly any clothes to put in" (thinking of slaves?); today we have sewing machines to fix clothes that need mending; modern soaps get dirt out better; our clothes don't rip as easily; our clothes don't have so many buttons and we have smaller hats than the big ones they used to wear; they had to make clothes by hand but we use machines; we have chemicals for cleaning clothes (this and other students who mentioned modern soaps seemed to believe that in the past people didn't have any soaps at all); we discard worn clothes and buy new ones, but they had to keep mending their old ones; we have clothes washing soaps; clothes are easier to get on and off today because we have zippers instead of so many buttons; describes a movie showing people in the past having to wash one garment at a time, then hang it up, etc.; in the past they had to care for just a few clothes and keep them neat, but we have play clothes that we can get dirty, and lots of them, so we don't have to be constantly taking care of them; today's clothes hold together better and don't rip and need mending; we have more people to work on making clothes, so we get it done faster; clothes are easier to make and to get on and off today; modern fabrics don't rip as easily as the animal-skin clothes of the past.

Discussion

At first glance, responses to Questions 10-12 seem to indicate that the students knew more about clothing far back in time than in more recent eras: 130 students made accurate statements and only 37 were unable to respond concerning the clothing of cave dwellers, 108 made accurate statements but 49 were unable to respond concerning the clothing of the Pilgrims and pioneers, and only 98 made accurate statements but 71 were unable to respond concerning clothing when their great-grandparents were children. However, the responses concerning more recent eras were more detailed. Most of the accurate responses concerning cave dweller clothing simply depicted the stereotype shown in the Flintstones and Alley Oop cartoons, and students who did not possess this stereotyped image and tried to respond in some other way tended to produce responses that were replete with misconceptions. In contrast, although more students were unable to respond when asked about the clothing of the Pilgrims, the pioneers, or the early twentieth century, those who did respond provided more lengthy descriptions of the clothing.

Descriptions of Pilgrim clothing clearly were based on illustrations shown in history texts, children's literature, or movies and television programs about the Pilgrims. Descriptions of pioneers' clothing were more varied, although clearly influenced by the buckskin outfits shown in history texts, children's literature, and movies and television programs about Daniel Boone, Davey Crockett, or other pioneer heroes. The responses produced by students who were not working from these stereotypes tended to be more accurate and less riddled with misconceptions than parallel responses concerning the cave dwellers' clothing. Concerning clothing when their great-grandparents were children, the students did not have a clear stereotype to work from, yet their responses were mostly accurate and the inaccurate ones contained only minor misconceptions. Thus, the students were more able to make reasonable inferences about

clothing in the relatively recent past than they were about clothing in the days of the cave dwellers.

Some of the more extreme misconceptions, which appeared mostly in responses concerning cave dweller clothing, suggested that clothes in the past were made from trees, wood, branches, leaves, bark, acorns, newspaper, rock, moss, straw, and “junk found in rivers.” Several students described pioneer clothing as army uniforms, probably as a result of watching movies and television programs featuring clashes between the U.S. Army and the Native Americans along the western frontier. Similarly, responses suggesting that the Pilgrims were given clothes by local Indians probably were extrapolations from the traditional First Thanksgiving story and other accounts of Indians helping the Pilgrims to survive.

If the students did possess a stereotype of clothing early in the 20th century, it was the idea that such clothing was rather drab, heavy, formal, and uncomfortable. Many students celebrated the proliferation of shorts and comfortable play clothes and the waning of the expectation that girls would always be expected to wear dresses. One surprise was that five students identified bell bottoms as clothing typical of the period. We suspect that these students were thinking of clothes worn to dress up as hippies for Halloween or 1960s days at school (and in the process, thinking that the 1960s were so long ago that their great-grandparents would have been children then).

The students generally viewed modern clothes as improved over earlier clothes in every way. Many were under the impression that earlier clothes were sewn poorly and easily fell apart. Other common observations included that today’s fabrics are lighter yet stronger and better at keeping us warm, that many modern fabrics are softer and thus more comfortable and less stiff or

scratchy, and that today we have larger and more varied wardrobes that allow us to adjust more completely to seasonal variations in temperature.

The students had only limited knowledge of inventions, but what was said (by the 25% who were able to respond) was accurate. The only misconception was one student's description of machines that flatten and press wool into cloth, which obviously was connected to the common misconception that cloth is a solid made by "smishing" raw materials rather than a fabric made by weaving threads.

The question about whether clothes are easier or harder to take care of today unexpectedly led to bifurcated lines of responses, with good reasoning shown in some of the responses supporting both conclusions. This occurred because the phrase "to take care of" was interpreted by most students in the way we intended (i.e., referring to clothes laundering and storage), but was understood by a minority to refer to "keeping track of." Thus, in addition to students who showed good reasoning by stating that clothes are easier to take care of today because of modern machines, better fabrics, modern storage, etc., other students showed good reasoning by stating that clothes are harder to take care of today because we have more clothes to keep track of and higher cleanliness expectations in modern business environments. Many of the rare and unique responses also showed good reasoning: Statements that clothes are harder to take care of today because we are expected to wash them more often, we have whiter/brighter colored clothes that are harder to keep clean, modern stains are difficult to eradicate, and many modern fabrics are delicate and require special handling, as well as statements that clothes are easier to take care of today because modern soaps and cleaning agents are better, the clothes come with cleaning instructions, and many of our clothes are shorter, lighter, more easily foldable, or otherwise easier to handle than the heavier clothes of the past. One unusual but

nevertheless accurate observation was that pioneer women often had to struggle to sew clothes while seated in bumpy wagons, whereas modern clothing workers sit on stable seats.

Most of the response categories for knowledge and thinking about clothes of the past and about improvements and inventions showed strong relationships with grade level. This was not the case, however, for categories for opinions about whether clothes are easier or harder to take care of today than in the past. The findings from our interviews on shelter also showed stronger relationships with grade level for categories that reflect students' knowledge than for categories that reflect their opinions (Brophy & Alleman, in press). The SES, achievement level, and (especially) gender differences observed for the categories shown in Tables 5 and 6 were relatively infrequent and unremarkable.

Modern Clothing Manufacture

Questions 14-16 addressed the manufacture and wearing of clothes in today's world.

Question 14 asked about the steps in the manufacture of clothing. For this question, the interviewer pointed to the student's shirt or dress and asked:

Question 14. How do you think your shirt (dress) was made? . . . What was the first step in making it? . . . Then what? . . . (Probe for specifics of process, not just statements about what it was made from.) (If the student's own shirt or dress doesn't produce a response or is ill-suited as a reference for the question, ask about your own clothing.)

Question 15 asked where the shirt or dress was made. Pilot interviewing had revealed that some students thought that clothing was made at or near the store at which it was purchased, but others knew that clothing can be manufactured almost anywhere but often is made near the source of raw materials.

Question 15. Where do you think your shirt (dress) was made? (If child says “in a factory,” ask “Where do you think the factory is?”)

Question 16 asked about clothing in other parts of the world. It was asked in part to see if students understood that not everyone in the world has the same access to the quality and variety of clothing that most Americans do, but also to probe their thinking about reasons why different people might dress differently.

Question 16. Are there people in other parts of the world who dress differently than we do? . . . Tell me about that. (Repeat for as many examples as the child can generate, and for each example ask “Why do they dress like that?”)

Statistical information derived from responses to Questions 14-16 is shown in Tables 7 and 8. Concerning steps in the manufacture of a shirt or dress, 22 students were unable to respond but the rest generated at least one response and many generated several. Categories A1 through A8 in the tables identify eight steps in the clothing manufacture process, in the order in which they ordinarily would be performed. No student included all of these steps in responding to Question 14, although many included several of them. The most common responses made some reference to sewing, stitching, or knitting pieces together to form a garment (99). Common elaborations on this basic response included references to weaving the cloth in the first place (63), dyeing the cloth to add color (34), adding trim, ruffles, belt loops, buttons, pockets, collars, or other elaborations of the basic garment (31), or adding a decorative design or logo (47). Smaller numbers of students referred to the steps of processing raw material (shearing sheep, picking and cleaning cotton, etc.) (19), spinning thread or yarn from the raw material (10), or cutting clothing into shaped pieces corresponding to the major sections of the garment (24). More than a quarter (58) of the students gave “black box” descriptions of the manufacturing

process. These students spoke of weaving (or simply obtaining) cloth and then using machines to “make it into a shirt/dress,” without specifically mentioning cutting cloth into shaped pieces or stitching the pieces together to form the garment.

When asked where their own shirt or dress was made, 64 students were unable to respond. Of the rest, 107 understood that the garment was probably machine-made at a factory, but 35 believed that it was machine-made at the store at which it was purchased, and 7 thought that it was hand-made by an individual. Some of the latter responses apparently were correct, because a few students were wearing shirts or dresses that had been made by their mothers or other relatives.

When asked to say more about where their shirt or dress was made, 69 students were unable to respond. Of the rest, 63 assumed that it was made at or near the store where it was purchased, 58 said that it was made in a factory located where raw materials are plentiful, and 23 said that it could have been made almost anywhere because clothes are made almost everywhere.

When asked whether people elsewhere in the world dress differently than we do, 12 students said no or were unsure and another 70 said yes but could not give examples or explanations. The remaining students provided at least one example of contrasting clothing styles. Some of these responses did not speak directly to the question because they did not refer to people in other parts of the world. Instead, they identified types of people who dress differently (the poor or homeless, boys vs. girls, the Pilgrims, the pioneers, etc.) (49) or talked about atypical forms of clothing (bathing suits, smocks, strips of cloth wrapped around the body, etc.) without identifying these clothing styles with other nations or cultures (15).

The remaining response categories did refer to people in other parts of the world. The most common such response identified particular examples of clothing (sombreros or serapes in

Mexico, robes in China, saris in India, etc.) and attributed them simply to differences in customs or culture (50). In addition, 40 students developed explanations based on contrasts in climate (fewer/lighter clothes in hot climates, more/heavier clothes in cold climates), and 12 developed explanations based on contrasts in the economic development of different parts of the world (third-world people lack access to the variety of clothes available here, some people have to make their own clothes from leaves or found materials, etc.). Overall, only about a fourth of the students were able to respond to this question knowledgeably by citing one or more specific examples of clothing commonly worn in other places or cultures, and many of these struggled to do so because they lacked specific vocabulary (e.g., serape, sombrero, sari, third world, economically underdeveloped).

The following examples are representative of responses to Questions 14-16 from students who varied across grade, SES, and achievement levels.

A. Kindergarten Students

1. Lance (low SES, low achiever)

14. How do you think your shirt was made? What was the first step in making it? I don't know.

15. (Question omitted)

16. Are there people in other parts of the world who dress differently than we do? Yes. (Tell me about that.) Some people dress nasty and some people dress beautifully. (Why is it that some people dress beautifully and others don't?) Sometimes others get messed up and other times they don't.

2. Denise (average SES, average achiever)

16. How do you think my blouse was made? I don't know. (What was the first step they'd have to do to make this?) I don't know.

15. Where do you think this blouse was made? (no response)

16. Are there people in other parts of the world who dress differently than we do?
Yup. (Tell me about that.) In India--it's a different country. I don't know anything else.

3. **Luke** (high SES, high achiever)

14. How do you think your shirt was made? What was the first step in making it?
They had to get like string. (Then what did they do?) Then they had to sew it. (Then what did they do?) Then they had to put . . . they had to put some elastic around it. (Would it be finished then or did they have to do some more things?) I don't know.

15. Where do you think your shirt was made? I don't know.

16. Are there people in other parts of the world who dress differently than we do?
Out in Alaska they wear heavy, heavy, heavy, heavy coats. (Any other parts of the world?) In Hawaii or in the jungle they wear like . . . they don't wear lots and lots of clothes.

B. First Grade Students

1. **Heidi** (low SES, low achiever)

14. How do you think your shirt was made? What was the first step in making it?
It was made of this stuff. (Of threads. OK. So what did they do first?) They took the needle and picked up the thread, they thread it, and then they lay it out when they're all done and then they make designs on it. It's just a plain white t-shirt and then they lay it out and draw any design they want.

15. Where do you think your shirt was made? I think it was made in Mexico.

16. Are there people in other parts of the world who dress differently than we do?
No. I would probably say no. (You think everybody dresses the same all over the world?) No, not the same all over the world [couldn't elaborate]

2. **James** (average SES, average achiever)

14. How do you think my jacket was made? What was the first step in making it?
Probably they took a black sheep and they took it off and then they rolled it together and inside of there they probably sewed on this side white, and they sewed on the other side blue. (I see. Then what?) And then probably they took that big gold pin and they just stuck it on.

15. Where to do you think my jacket was made? In Africa because a lot of stuff is made in Africa. I found trolls made in Africa, trash cans . . . all kinds of stuff is made in Africa.

16. Are there people in other parts of the world who dress differently than we do? Yeah, everybody has different clothes. See, you're wearing different clothes than I'm wearing. That's because you're a grown up and I'm a kid. All the kids my age in my class wear different clothes than I wear. (Well, think about people in other parts of the world.) Well, like in Africa, their clothes are a lot different than our clothes. Like in Chicago, their clothes are kinda same as our clothes. (Well, you spoke about Africa. Why is it that the people in Africa wear different kinds of clothes than we do?) Cause probably some people who live there don't know how to make our clothes and we don't know how to make their clothes.

3. **Anna** (high SES, high achiever)

14. How do you think your shirt was made? What was the first step in making it? Out of cloth. (What was the first thing they had to do?) Weave it together. (Then what?) Then they had to sew it and put it together. (Then what?) Then the color.

15. Where do you think your shirt was made? Um . . . from the store.

16. Are there people in other parts of the world who dress differently than we do? Um hum. (Tell me about that.) Their pants are different, their shorts are a little bit longer, and um . . . they don't wear shoes. (Why do they dress differently than we do?) Because they're from somewhere different and they don't want to dress the same as we do because they don't want to look just alike.

C. Second Grade Students

1. **David** (low SES, low achiever)

14. How do you think your shirt was made? What was the first step in making it? Sew it. (Then what?) They do stuff on it, like . . . (The stuff on it--you mean the printing on it.) Yes. I don't know how they made that. I know how they made this part. (Well, how did they do that?) They sewed it. (They just sewed it, you think? On your sleeve?) This part here, I think they put that through the sewing machine.

15. Where do you think your shirt was made? Um . . . in China or the U.S.A. (Why do you think that?) Cause most clothes are made in China and some of the clothes are made in the U.S.A.

16. Are there people in other parts of the world who dress differently than we do? Yeah. (Tell me about that.) They dress . . . like the real rich people--they got real nice clothes. They ain't like these clothes I got on. They got nice shoes and they got some nice clothes. They're dress-up clothes; they ain't like working clothes or playing clothes.

2. **Tanya** (average SES, average achiever)

14. How do you think your shirt was made? Um . . . out of like . . . a caterpillar, like for silk. (OK, you get silk from a caterpillar. What was the first step in making your blouse?) They had to buy the stuff, like the cloth. Then they had to buy the buttons and the thread to sew it up with. (Then what?) And then they put like some designs on it.

15. Where do you think your shirt was made? I think at a factory. (Where do you suppose that factory is?) Like um . . . in a building that makes stuff.

16. Are there people in other parts of the world who dress differently than we do? Some people have just pants and some people just have dresses. That's all I can think of.

3. **Mike** (high SES, high achiever)

14. How do you think your shirt was made? What was the first step? It was made of cotton and it was sewed together. (What was the first step in making your shirt?) Getting the cotton and turning it into string. (What'd they have to do next?) Then they have to sew it all together and put the designs on it. (What parts did they have to sew?) The sleeves, and the front part and the back. (Did they have to do anything else to make your shirt?) I don't know.

15. Where do you think your shirt was made? Probably at a company. (Do you know where this is located?) No.

16. Are there people in other parts of the world who dress differently than we do? Chinese people do, Japanese, Taiwan . . . (How do the Chinese dress?) They usually dress with clothes with different kinds of pictures and colors. (Why do they dress like that?) They have different things than we do. (You said the Japanese dress differently. How do they dress?) They dress sort of like the Chinese. (Why do they dress that way?) Because they like that style. (The Taiwanese?) They always wear dresses and . . . (Why do the Taiwanese women always wear dresses?) They like the dresses more than pants.

D. Third Grade Students

1. **Jason** (low SES, low achiever)

14. How do you think your shirt was made? What was the first step in making it? They sew it together. (What was the first step in making your shirt?) String. (What did they do with the string?) They put it in a needle and sewed it together. (What'd they do next?) They cut it up into a shirt. That's all.

15. Where do you think your shirt was made? Ohio probably. (Why do you say Ohio?) [no response]

16. Are there people in other countries who dress differently than we do? Yeah. (Do you know any groups of people who dress differently?) Native Americans. (What way do they dress differently?) I don't know. (Why do they dress the way they do?) Because they don't have anything else to wear. (Any other reasons?) No. (Any other groups of people?) No.

2. **Kevin** (average SES, average achiever)

14. How do you think your shirt was made? What was the first step in making it? Probably from thread from sheep--wool, I mean. They probably dyed it and just made it. You can see some of it here.

15. Where do you think your shirt was made? I forgot. I've got to cheat and look [at the tag in his shirt]. (That might tell you the name of the people but I wonder if it will tell you where it was made.) It doesn't tell. (Well, where do you think?) Probably China. (Could be.) Aha. U.S.A. (It's made in the U.S.A., but you said you guessed it was made in China. Why did you say that?) Because it looks like China. (What makes you think it looks like China or the Chinese made it?) Because the Chinese like dark colors and you can see there's a lot of dark colors in it. That's why I thought it was made in China, but it's not.

16. Are there people in other parts of the world who dress differently than we do? Like China and Europe and Africa. In Africa, they got like underwear but not the kind we have in the U.S.A. We have different colored underwear but not with designs on them, and in China they wear like real big hats and real heavy stuff, and in Europe--I have no idea. (Well, why do the people in China, for instance, dress differently?) Probably they dress for their gods because one of my friends named Mei, she's part China--she is full China actually, and she dresses like she does because they dress for the gods. That's what I believe.

3. **Carlie** (high SES, high achiever)

14. How do you think my blouse was made? What was the first step in making it? They got cotton and made it into thread and then they sewed it. (Then what?) They sewed it into different parts and attached all the parts together, and then they sold it to you.

15. Where do you think this blouse was made? Near here, like in Lansing maybe. (Why do you think that?) Cause in different countries they wear different clothes and you're from this state so you probably got it in Lansing.

16. Are there people in other parts of the world who dress differently than we do? Africans just wrap clothing around them and in Indonesia, they kind of have different . . . I don't know. Stuff like that. In India, they have a lot of beads on their clothes. (Well, why do they dress like that?) I don't know--that's just how they like it.

Grade Level Differences

Tables 7 and 8 indicate that 21 of the 27 responses categories derived from Questions 14-16 showed statistically significant relationships with grade level, and 18 of these showed the expected progressions. Concerning steps in the manufacture of a shirt or dress, more younger students were unable to respond and more older students identified two or more steps. In particular, older students were more likely to generate “black box” explanations referring to machines that take cloth and make it into a shirt or dress, to speak of spinning thread or yarn from raw material, and to speak of adding trim, ruffles, belt loops, etc. There were nonlinear relationships with the categories for stitching the pieces together to form a garment and adding decorative designs or logos. Third graders were more likely than younger students to provide “black box” explanations of the garment manufacturing process instead of making specific reference to stitching pieces of cloth together to form the garment. First and second graders were more likely to refer to decorative designs or logos than kindergarteners or third graders.

Concerning where the students’ shirt or dress was made, younger students were more likely to be unable to respond or to believe that it was made at or near the store at which it was purchased, whereas older students were more likely to know that it was made at a factory. Parallel differences were seen for the students’ attempts to explain their initial answers. Younger students were more likely to be unable to respond or to believe that the garment was made somewhere near where it was purchased (i.e., to say that it was bought at a certain store so it must have been made at or near that store). Older students were more likely to say that it was made at a factory located where the raw materials (e.g., cotton, silk, etc.) are plentiful or that it could have been made almost anywhere.

Concerning whether people in other parts of the world dress differently than we do, younger students were more likely to say no or that they didn't know, as well as to say that they do but be unable to provide examples or explanations. Older students were more likely to say yes and provide one or more explanations. In particular, older students were more likely to provide explanations based on contrasts in climate or to generate specific examples ascribed to differences in culture or custom. A nonlinear relationship was observed for explanations based on contrasts in economic development. For some reason, first graders were more likely to make such responses than students in other grades.

Overall, the responses to these questions were relatively free of misconceptions and the response patterns showed the expected progressions with grade level. One seeming surprise was that third graders were less likely than younger students to speak of stitching pieces together to form a garment and much more likely to generate "black box" explanations of the garment manufacturing process. However, we believe that this seeming regression actually represents development of knowledge. The younger students apparently envisioned an individual performing each successive step in the manufacturing process, using nothing more complicated than a sewing machine (many of them may have observed their mother or some other relative making clothes at home in this manner). However, the third graders apparently had developed some initial understandings of the fact that the clothing manufacturing processes are more automated and involve more complicated machinery than simple sewing machines, so most of them had abandoned the image of a single person manufacturing a garment step by step from raw materials to finished product. They had not yet replaced this image with clear images of what occurs in clothing factories, however, so the best that many of them could do was the "black box" explanation. Even though this is vague and doesn't spell out the fact that the same basic

steps are being done via automation and mass production, it represents an advance over the images held by younger students.

Socioeconomic Status, Achievement Level, and Gender Differences

Whereas 21 of the 27 response categories for Questions 14-16 showed statistically significant relationships with grade level, this was true of only 7 categories for SES level, 8 for achievement level, and 1 for gender. Higher SES students were more likely than lower SES students to mention processing raw material in talking about the steps in manufacturing a garment. When asked about why their shirt or dress was made where it was, the higher SES students were more likely to be able to provide a substantive response, and in particular, to suggest that it was made at a factory located where the raw materials are plentiful. The other four significant relationships with SES level were nonlinear ones, all reflecting the unexpected finding that middle SES students were less able than other students to identify steps in the garment manufacturing process or say where their shirt or dress was made.

The eight significant relationships with achievement level all reflected expected progressions. Lower achievers were more likely to think that their shirt or dress was made at or near the store where it was purchased, as well as to say “No” or be unable to respond when asked if people in other parts of the world dress differently than we do. Higher achievers were more able to specify steps in the garment manufacturing process, to say that their shirt or dress was made at a factory, and to develop explanations based on contrasting climates in explaining why people in different parts of the world dress differently.

Boys and girls responded very similarly to Questions 14-16. The only significant difference was that 15 boys but only 4 girls included processing raw material in identifying the steps in garment manufacture.

Relationships Among the Response Categories

Again, response categories that showed the clearest progressions with grade level tended to correlate with one another and with response categories from other parts of the interview that represented more sophisticated responses to the questions. Among the categories for responses to Questions 14-16, these included identification of specific steps in the manufacturing process (especially spinning thread and weaving cloth) as well as “black box” explanations, knowing that their shirt or dress was made at a factory, suggesting that the factory was located near where raw materials are plentiful or that it could have been located almost anywhere because clothes are made almost everywhere, and providing specific examples or explanations of how or why people in other parts of the world dress differently than we do.

Students who mentioned spinning or weaving as steps in the clothing manufacture process were more likely than other students to have stated previously that cloth is woven thread and thread is spun from raw material.

Students who said that the factory that made their shirt or dress was probably located where raw materials were abundant were more likely than other students to have said earlier that clothes are made from wool or animal hide or from cotton, silk, etc.

Students who said that the factory might have been located almost anywhere because clothes are made almost everywhere were more likely than other students to have said earlier that

our clothes are improved over the clothes of the past because we now enjoy a greater variety of choices.

Finally, students who developed explanations based on climate contrasts to explain why people in different parts of the world dress differently were more likely to have said earlier that we wear clothes because they protect us from cold and other problems, that work clothes protect the workers, and that modern clothes are improved over clothes of the past because they are better at keeping us warm. In addition, in responding to a subsequent question about why they would buy a particular shirt, they were more likely than other students to talk about the season of the year (i.e., to say that they would buy a short-sleeved/lighter shirt in warm weather but a long-sleeved/heavier shirt in cold weather). Thus, an awareness of climate and the notion that clothing protects us from the cold ran throughout these students' responses.

Rare and Unique Responses

The following responses to Questions 14-16 involve interesting elaborations on the ideas represented by the coding categories or embody ideas that are not included in those categories.

Steps in Manufacturing the Students' Shirt or Dress

Kindergarten: Smush the cloth into little pieces and make it soft, then sew it; speaks of a thread maker and of "slamming" thread together to make cloth; they make the neck part first; they glue the pieces together; cut off the extra and make the shirt from here to there.

First grade: Speaks of "getting the wool inside of the shirt" (one of several students to suggest a vague template to which wool, cotton, etc. is attached, sometimes as lining); our

clothes are made from feathers; they sew it first, then add cotton (substrate plus layer notion); after the dress is made, it is put into a machine that stretches it up to size 7.

Second grade: One student added several steps at the end of the process: boxing the shirt, keeping it clean, and shipping it to a store for sale.

Third grade: After a garment is made, it is machine shrunk or stretched to size. One third grader's response is quoted here to illustrate "black box" responses: In factories, they use this machine to make clothes. They put cloth or string or whatever you want to call it on it, and then the sewing machine designs the color they want. After they get done sewing the thing, they could use stencils and spray paint it (couldn't explain further).

Where the Student's Shirt or Dress Was Probably Made

Kindergarten: New York; in a different state; California; far away; England.

First grade: Mexico; knitted by a person far away; Washington or China; in Africa, because a lot of stuff is made there; California; Canada; at a factory in a city or something.

Second grade: Most clothes are made in China or the U.S.A.; in a country where there is wool and cotton; in a factory near clothing stores; at a K-Mart; by a man in Florida or Alabama; made in the country on farms (2).

Third grade: Taiwan; Miami; made close to where it was sold, so they didn't have to pay much for shipping; in Lansing or China (China seems to be the default choice for an origin outside of the United States); at Sea World (because the shirt said "Sea World" on it); a long way from here; probably in China because the Chinese like dark colors (the shirt was dark colored).

How and Why People Dress Differently in Other Parts of the World

Kindergarten: Some dress nasty and some beautifully; in India, girls wear long skirts wrapped around their legs and cloth that they tie together to cover the top of their body (Why?) They think God wants them to; some people wear shorts on a cold day or long-sleeved shirts on a hot day; black people dress like teenagers (couldn't elaborate); unlucky people don't have clothes like ours; grandmas and grandpas dress fancier and boys and girls dress differently; Chinese and Hawaiians wear grass skirts; pioneers, Indians, and cowboys dress differently; cowboys; farmers; some people wear Indian (Native American) stuff; boys and girls dress differently and people in different countries dress differently (no examples); in Mexico, there are different people who like to wear different clothes; Indians (2); Hawaiians wear grass skirts; India, Germany (no specific examples); in Pakistan they wear shawakamis (like pajamas)—my dad is from Pakistan and he took me there with him—also, in China they wear little hats and long clothes; heavy coats in Alaska, few clothes in Hawaii or the jungle; little skirts and necklaces in Hawaii.

First grade: Indians, Santa Claus, and the elves; Indians, Pilgrims, homeless people; shorts in Hawaii because it's hot; on Halloween; some people don't have nice clothes like us, they have raggy clothes; Indians, the homeless, and Mexicans because they don't know how to dress like we do; in China, it's sunny so they need hats and different clothes than us; the Chinese dress lightly, Alaskans dress warmly, cowboys wear cowboy clothes (2); in China they don't have many stores like we do; at the poles, they dress warmly, Chinese wear pretty, colorful clothes; Japan, Mexico, England; in China they wear little dresses, put up their hair, and use unusual makeup and jewelry; Indians (4); Africans don't know how to make our clothes, and vice versa; the Chinese wear thick clothes to protect them from the sun; Africans—we had the

idea about how to make our clothes, but they didn't; in Somalia, they dress sort of like Indians because they're poor; in Africa they don't have enough room to have machines because all the machines will have a melt-down because it's so hot and the metal will melt; hats and raggy clothes; Indians and poor people don't have clothes, so they have to make them from animals; in some places, it's harder to get different kinds of t-shirts; Chinese wear bigger clothes, mostly red and blue; Japanese dress in robes and India is a poor country so people "can't afford stuff;" Indians and Pilgrims (2).

Second grade: Rich people have extra nice, dress-up clothes; in India they wear robes because they never saw our clothes; where there are no factories, people just wrap cloth around them or don't wear any clothes; Indians and Pilgrims; in some places (Africa, Brazil, England) they have clothes that look big (apparently meant thick or heavy, but couldn't explain); in China they wear little hats and boys and girls wear the same clothes; some people are bare because they don't have any animals to kill where they live; different cultures lead to different clothes (can't give examples); in Africa they wear togas because of their culture; they wear colorful clothes in hot places; the Scots wear colorful (plaid) clothes; Africans wear "animal clothing" (i.e., skins rather than woven cloth); Asians wear garments that "just cross over and then come down," and a different kind of sandals than ours; some people don't have much money and have to make their own clothes, and sometimes they are not made very well, especially if the person who usually makes them is sick or something; Indians (3); some people just have pants, some have dresses (contrasting males and females); in Japan they wear kimonos and weird hats (because they are different from us and don't know how to make clothes like ours); in China and especially Guam, they wear bright colors because they're near the equator, but in Alaska and Russia they're closer to the North Pole and wear clothes to keep them warm; Pilgrims, cavemen,

and people who wear smocks or bathing suits all day; flowery shirts in Hawaii, white shirts and white clothes in Mexico (maybe they don't have colored thread like we do); big old hats and blankets to protect them from the sun in Mexico; Negro people dress differently (couldn't explain); in Africa people don't wear shirts—it's their religion; describes homemade little skirts and "things over their heads" that are worn someplace (couldn't identify the place); in Korea, China, and Africa, they make clothes that are different, using brighter and dark colors; richer people have better clothes than poor people; in Egypt, a long cloth is wrapped around them and sandals—it's their religion; in China, Japan, and Taiwan they wear dresses with different pictures and colors than we use; Indians wear ceremonial clothes during pow wows but otherwise dress like us.

Third grade: Twins dress alike; flowered clothes in China; Indians (4); in Mexico they wear big hats to keep the sun out of their eyes (goes on to say that Mexico is the only place where people dress differently than we do); rich vs. poor people; uniforms in Russia because there are lots of wars there; in China men wear long-sleeved garments with metal things on their heads like plates; pioneers; punks wear cut-off sleeves, purple hair, etc. and the Japanese wear little hats with robes with flowers or birds and the Mexicans wear white shirts with short (cut off) pants; in Africa they wrap a blanket around their upper bodies and wear shorts with no shoes; in France they wear dresses (thinking that here women wear suits or outfits); in Africa they wear more colors (saw this on a video in a social studies class), in Hawaii they wear grass skirts, and in the Philippines they shorts and other clothes that keep you cool in the heat (knows this because Filipino science teacher told about coming to the U.S. wearing light clothing and being cold when she stopped in Alaska; in Africa they wear armless/sleeveless clothes or one sleeve only and headbands, and in Europe they wear different clothes from ours, like turbans or capes;

old people wear old-fashioned clothes; workers who get dirty or greasy in their jobs wear special protective work clothes and Chinese wear little hats and flowered clothes (thinks that these are the only clothes available in China); Chinese girls have to wear dresses—no pants or shorts; boys and girls dress differently and in China they wear long robes; in China they wear big hats and heavy stuff, in Africa they wear “like underwear” but with designs on them that we don’t have here; people who “believe in crime” dress dirty, but people who don’t believe in crime dress clean and neat; in Japan they wear Karate pants; saw on TV that Chinese wear long dresses and funny little hats that look like pan tops; rock stars dress like head bangers and Hollywood stars dress up in suits and nice dresses; the French carry bagpipes and wear skirts instead of pants (confuses with the Scots); in Japan they wear robes and in China they wear pants and in England and France they dress really nice; baggy clothes and different hats compared to our clothing and our “sports hats;” saw the Japanese exhibit at the Epcot Center but can remember anything about the clothing; in Scotland or somewhere they wear tall, plain hats; soldiers dress in uniforms; in China they wear hats like flattened ice cream cones and big, colorful, droopy dress-like clothes; in China they wear kimonos, silk dresses, and other silk clothes (adds that they can wear expensive clothes because China has gold, rubies, and lots of money); some people just wrap clothes around them (can’t say who); in Africa they wear animal-skin skirts and blankets wrapped around them; in Malaysia they wear “blouse dresses;” in Africa they sometimes wear whatever cloth they can find, even leaves, and some people dress differently due to their religions; in India and Pakistan men wear “like a dress” over their pants and women wear dresses that are different from ours (this student has visited these countries); in Africa they wear no shirts and tiny “shorts things;” some people dress according to their religious beliefs; in India men wear “swim suit things;” in some places they don’t have the same equipment we have here, so

they have to use other stuff to make clothes; in Africa they wrap cloth around them and in India they have beads on their clothes.

Discussion

Almost 90% of the students were able to name one or more steps in the manufacture of a shirt or dress, and most of these responses were accurate as far as they went. However, they were not particularly impressive. Only minorities of students mentioned the key processes of spinning thread (10) and weaving cloth (63). The majority thought of cloth as a solid and thought of thread only as a means for stitching the pieces of a garment together (not as the basic material from which the garment itself was manufactured). Instead of focusing on steps involved in manufacturing the basic garment, many responses focused on dyeing for color or on adding finishing touches that create features that are especially noticeable to children (trim, ruffles, belt loops, buttons, pockets, collar, etc. or decorative designs or logos).

Descriptions of the steps involved in manufacturing the basic garment often were vague or incorrect, for two basic reasons. First, many students thought of cloth as a solid created by “smishing” material rather than as a fabric woven from thread. Second, the students who knew the most about the nature of cloth and clothing (the third graders) understood that manufacturing clothing in factories is not the same as making garments at home using patterns and a simple sewing machine, but they had not yet developed clear images of the processes or steps involved in mass production. Consequently, these students tended to give black box explanations of automated clothing manufacture by machines in factories. It appeared that many of these students did not realize that these machines perform essentially the same steps that are performed by individuals making clothing at home (cutting cloth to form major parts of the garment

following pattern specifications, then stitching these together to form the basic garment, etc.). A few students thought that a basic garment manufacturing machine produced garments that were all the same size, and these then were moved on to other machines for shrinking or stretching to create other sizes.

Only half (107) of the students were able to say that their shirt or dress was probably machine-made at a factory, and of these, only 58 said that the factory was probably located where raw materials are plentiful. Among the other half (106) of the students, some could not respond and most of the rest (63) thought that the garment was made near where it was purchased (including 35 who thought it was made at the store itself). Most of these students apparently just assumed (without explanation) that clothing is made at or near the store at which it is purchased. However, one student rationalized this assumption by suggesting that this arrangement minimizes shipping costs.

Students who raised the possibility that the garment had been made in another country tended to nominate Asian countries, especially China. It was not clear whether these students actually understood that much contemporary clothing is made in Asia or whether they just named China because that seemed to be these students' default choice for "a foreign country."

Most of the younger students had trouble responding to the question about how people in other parts of the world dress differently than we do, but most of the older students answered it effectively by generating climate explanations or culture/custom examples. This question yielded quite a variety of responses, including several noteworthy naïve ideas and misconceptions (references to Santa Claus and his elves, to machines melting down because of the heat in Africa, to places where there are no clothes because there are no animals or only homemade clothes because there are no factories, to the lack of colored thread in Mexico, to

people who “believe in crime” and dress dirty, and to an abundance of gold, rubies, and riches in China). Most of the rare and unique responses could be considered accurate. As a group, however, these responses are somewhat troubling because many of them reflect stereotypic images and some suggest ethnocentrism (all of the responses that boil down to “they don’t dress like us because they don’t have what we have or know how to do what we know how to do”), including a few that suggest incipient bias toward Mexicans, Africans, or African-Americans. This underscores the importance of choosing cultural illustrations with care and helping students to get past stereotypes and learn about other cultures and customs in ways that encourage understanding and empathy rather than chauvinism.

The grade level, SES, achievement level, and gender patterns for this set of questions were unremarkable except for the finding that third graders were more likely to give black box explanations for the clothing manufacturing process, whereas younger students were more likely to talk about sewing, stitching, or knitting cut pieces together to form the garment. At first glance, this contrast seems to indicate a regression in the thinking of the third graders, but we interpret it as evidence that these students have moved beyond the image of an individual making a garment using a simple sewing machine to some level of understanding that garment manufacture in factories involves mass production and more complicated machinery (but without yet possessing very clear images of the processes or machines involved).

Shopping for a Shirt

Question 18 addressed the criteria that students would take into account in making decisions about purchasing a shirt:

Question 18. Let's talk about shopping for clothes. If you were going to buy a shirt, where would you go to buy it? . . . Why? . . . How would you decide what shirt to buy? . . . Would you think about anything besides _____ when deciding what shirt to buy?

Statistical information derived from responses to Question 18 is shown in Sections E and F of Tables 7 and 8. Students' responses were coded for their reasoning concerning the store at which to purchase the shirt and which particular shirt to purchase.

Concerning where to buy the shirt, only four students were unable to respond but 81 could do no more than name a store (e.g., K-Mart) or say that they would go to a mall or store that sells clothes. The remaining students were able to give one or more reasons for choice of store: 64 said that the identified store offers clothes of good quality, 62 that it offers a large selection of clothes, and 21 that it sells clothes at reasonable prices or has good clothing sales. All of these were good reasons, and none suggested misconceptions.

Concerning their reasoning in deciding on a particular shirt, 27 students were unable to respond but the others supplied one or more criteria. The most common responses were that they liked the appearance of the shirt (69), that it was the right size for them or fit them well (58), that they liked the color or combination of colors (53), and that they liked the design or print used to decorate it (51). Responses that appeared less frequently included statements that the shirt was reasonably priced or affordable (34), that they were looking for a particular kind of fabric or liked the feel of the shirt when they touched it or put it on (20), that the shirt looked good on them when they tried it on (17), that the shirt was suited to the season (light/short-sleeved for warm weather, heavier/long-sleeved for cold weather) (12), that the shirt appeared to be of good quality, unlikely to shrink or unravel (9), that the shirt either matched the child's existing wardrobe or complemented it nicely (8), that the shirt matched the child's taste in style or

fashion or was currently “in” (7), or that the style or decoration made the shirt suited to the child’s gender (6). In addition, there were 15 “other” responses (e.g., that the shirt was clean or that it matched the shirt being replaced). Again, these rationales all make sense, although they place more emphasis on the color, appearance, and design or print of the shirt and less emphasis on its cost, quality, or fabric than we would expect to see in responses by adults.

The following examples are representative of responses to Question 18 from students who varied across grade, SES, and achievement levels.

A. Kindergarten Students

1. **Lance** (low SES, low achiever)

Meijer’s. (Why would you go to Meijer’s?) [couldn’t explain] (How would you decide which one to buy once you got to Meijer’s?) I don’t know.

2. **Denise** (average SES, average achiever)

At a store. (What store?) Any kind of store. (How would you decide what shirt to buy?) I would look at what color they are. (What else besides color?) I don’t know.

3. **Luke** (high SES, high achiever)

K-Mart. (Why?) They got lots of shirts. (How would you decide which shirt to buy?) Like if I could find a shirt that had some tigers on it, I would buy it. (What other things do you think about when you’re going to buy a shirt?) I don’t know.

B. First Grade Students

1. **Heidi** (low SES, low achiever)

Meijer’s. (Why would you go to Meijer’s?) Because they have all different kinds of clothes, all different sizes. (So how would you decide which one to buy?) A silk blouse and I want kitty cats on it. (OK, you want a special print.) Then I’d want hearts on it too. (So you’d think about the design and the print. What else would you think about?) Maybe some blue flannel pants. (Well, just thinking about this blouse--out of all the blouses they’ve got, which one . . .) Red, purple, orange, blue.

2. **James** (average SES, average achiever)

K-Mart. (Why would you go there?) Cause they have lots of nice clothes there and they look nice and they don't have another state's clothes but our clothes. I think it's just nicer. (How would you decide what shirt to buy?) I would probably buy the nicest, the coolest, and my favorite.

3. **Anna** (high SES, high achiever)

Maybe Meijer's. (Why would you go there?) Cause they have nice blouses. (How would you decide which blouse you were going to buy?) See if it fits right, see the right size it was. (Anything else?) If I like the color and see if I liked the look.

C. Second Grade Students

1. **David** (low SES, low achiever)

Value City. (Why would you go to Value City?) They got some good clothes there. (How would you decide which shirt to buy?) You have to look at it and you have to think awhile, and if you got some good pants and the shirt will go with the pants, you'll get it. And if it's a girl's, you won't get it. And if it's a boy's, you would. (Any other things you'd think about?) What do it got on it. (If it has a design. Anything else?) It seems like if you got some black pants, and you saw a shirt and it was black, I would have got it if it was a boy's and it was the right size for your kid.

2. **Tanya** (average SES, average achiever)

At the mall. (Why would you go to the mall?) Because they have good clothes, I guess. (How would you decide which shirt to buy?) Because one's prettier than the other. (OK, so you'd want one that was pretty. What else?) Um . . . and it's cool to wear.

3. **Mike** (high SES, high achiever)

The mall. A store that sells clothes. (Why would you go to the mall?) Because they sell clothes there. (How would you decide what shirt to buy?) By the style it is. (Do you think about anything besides the style?) The way it feels.

D. Third Grade Students

1. **Jason** (low SES, low achiever)

The mall. (Why?) It has lots of stores. (How would you decide what shirt to buy?) I don't know. The colors. That's all.

2. **Kevin** (average SES, average achiever)

Probably a mall. Yeah, a mall and see what size it is, try it on, see what it looks like, and if it fits you, buy it if you want to. (So if it fits, you'd buy it. Is there anything else you'd consider in choosing a shirt?) Yeah, if it has the stuff you want--you can't just walk in and say "I want this shirt. Can you change the design?"

3. **Carlie** (high SES, high achiever)

To a store, like to the mall. (Why would you go there?) Because they have a lot of clothes there. (How would you decide which blouse you were going to buy?) The one that fit you better and looks better on you. (Fits better and looks better. Anything else?) No, I guess not. Oh, costs less.

Grade Level Differences

Tables 7 and 8 indicate that 10 of the 21 response categories derived from Question 18 showed statistically significant relationships with grade level. All of these showed the expected progressions, with more younger students coded as unable to explain their decision making and more older students offering substantive rationales. More older students mentioned quality, selection, and/or price when explaining their choices of store at which to purchase the shirt, and more mentioned that the shirt looked good on them when tried on, that it fit well, or that it matched their taste in style or fashion when explaining their reasons for selecting a particular shirt. Older students were especially likely to give two or more reasons in explaining the first choice and three or more reasons in explaining the second.

Socioeconomic Status, Achievement Level, and Gender Differences

Whereas 10 of the 21 response categories for Question 18 showed statistically significant relationships with grade level, this was true of only two categories for SES level, three for achievement level, and two for gender. The two significant relationships for SES level were

nonlinear ones: middle SES students were more likely than other students to be unable to explain their choice of a store and to mention the season when explaining their choice of a shirt.

High achievers were more likely than other students to say that they would choose a particular shirt because it matched the season or because it matched the student's taste in style or fashion. However, there also was a positive relationship with achievement level for the category indicating that the student was able to identify a store at which to purchase a shirt but unable to explain this choice beyond stating that the store sells clothes. This positive relationship with achievement level is surprising, because this response appears to be less sophisticated than responses explaining the choice of store with reference to the quality or selection of its clothes or its reasonable prices. It is difficult to understand why more higher achievers didn't explain their choice of store more substantively; perhaps they thought that the appropriateness of their selection (i.e., of the store they named as the place they would go to buy a shirt) was obvious and didn't need explaining.

The two gender differences indicated that 31 boys but only 20 girls mentioned the shirt's design or print as a reason for buying it, whereas only 1 boy but 5 girls mentioned the gender-appropriateness of the shirt. Neither of these differences was expected and each reaches only borderline levels of statistical significance, so we will not attempt to interpret them.

Relationships Among the Response Categories

Again, response categories that showed the clearest progressions with grade level tended to correlate with one another and with response categories from other parts of the interview that represented more sophisticated responses to the questions. Among the categories for responses

to Question 18, these included mention of quality, selection, and price as reasons for selection of a store and mention of the shirt looking good when tried on, fitting just right, or matching the student's taste in style or fashion in explaining choice of shirt.

Students who mentioned taking into account the season in deciding what shirt to buy were more likely than other students to have said previously that clothes protect people from the cold and that differences in climate are one reason for differences in the clothes that people wear in different places.

Students who mentioned reasonable prices in explaining their selection of a store were more likely than other students to mention the price of the shirt as a factor in deciding to buy it.

Students who mentioned the style or fashion of the preferred shirt were more likely than other students to have previously stated that we wear play clothes because they are more comfortable than other clothes. Most of these students spoke of looking for comfortable clothes in talking about the kind of shirt they would buy (frequently, a sweatshirt).

Students who talked about buying a shirt that was made of a particular fabric were more likely than other students to have previously said that today's clothes are improved over earlier clothes because we have lighter/softer fabrics or because they are sewn better and won't fall apart.

Rare and Unique Responses

The following responses to Question 18 involve interesting elaborations on the ideas represented by the coding categories or embody ideas that are not included in those categories.

Rationales for Choice of Store

Kindergarten: K-Mart—it's a big place where you can get toys and stuff; it's the closest store to us; it's the best place (unexplained); it's the only place that we know to get clothes; a sports place, to buy sports shirts; my grandma told her son to go there, and he's my dad.

First grade: (none).

Second grade: My mom knows that store well, what is on all the aisles; we go to the mall because shopping there is fun; my mom likes the clothes there and we live close by.

Third grade: One student said that he prefers a particular store because their clothes have few buttons and thus are easy to get on and off.

Rationales for Choice of Shirt

Kindergarten: A shirt like this one (that the student is wearing now); you would want either short sleeves or long sleeves (depending on the climate); how the shirt feels (not explained further); if you are a girl, you want a girl's shirt; a turtleneck or undershirt.

First grade: Get one different from what you have already; good fabric that won't shrink or rip easily; get another blouse like this one; quality—how it's made, how hard they worked on it; a shirt that matches your pants; see if the shirt is OK to wear to school; a shirt for a girl; shirts that are soft and clean; a shirt that goes with my other clothes; good quality; my style.

Second grade: A shirt that matches your pants and it's a shirt for a boy; make sure it's neat; it matches your other clothes (2); see if it's thick or smooth; it's easy to wash and care for; look for clothes that won't stain easily, or that stains can be washed out of easily; it has to be practical because I'm big and can't wear overly fancy blouses; I would feel them (doesn't explain further); clean; how it's made (quality); I would look for school clothes and church

clothes; style; if it matches my other clothes, shoes, and jewelry; the style and the way it feels (not explained further); a good quality shirt that will last a long time.

Third grade: A girl's shirt (2); nice styles that are up to date and colorfast so the color won't bleach out; play clothes that are OK to get dirty; clothes that have few buttons and are otherwise easy to get on and off, like sweatshirts; up-to-date clothes, not old-fashioned; make sure it's your style; see how it feels (unexplained further); matches your pants; make sure there are no holes in it; would get a women's blouse or shirt made for a girl and feel it to see if it is silk or cotton or whatever; look for shirts that are in style now; would look for "a certain fashion" that she likes; would look into the quality (who made it, is it washable or must it be dry cleaned, can you return it if you are not satisfied); looks for quality and buys more expensive clothes; would look at it to make sure that it will "last good;" if I had a special need like buying dressy clothes for a fancy party; matches my other clothes (2).

Discussion

As was the case with their responses to questions about different kinds of clothes (business, work, play), the students' responses to our questions about shopping for clothes were accurate as far as they went and free of misconceptions. One surprise was that only 60% of the students were able to supply one or more reasons to explain why they would go to a particular store to buy a shirt, and furthermore, this response category showed a negative relationship with achievement level. That is, more lower achievers supplied one or more reasons for their choice of store, whereas more higher achievers were unable to do so. This was the only instance in the findings from our two first studies (on shelter and clothing) in which the data appeared to indicate that lower achievers were able to generate more complete or accurate responses than

higher achievers. Perhaps more of the higher achievers thought that the question about why they would select a particular store in which to buy a shirt was silly and the answer to it was obvious (i.e., because they sell shirts/clothes there), so they didn't think to comment further about the quality, selection, or prices of the shirts/clothes available at that store. Whatever the reason, more higher achievers than lower achievers gave only "because they sell shirts/clothes there" as an explanation for their choice of store.

The substantive explanations for choice of store were concentrated on quality, selection, and price—all reasonable criteria. Even the rare and unique responses were free of clear misconceptions, although many of the unique responses did not include compelling rationales explaining why the selected store would be a good place at which to buy a shirt (e.g., it's the closest store). This category also included the charming explanation that the family patronizes a certain store because "my grandma told her son to go there, and he's my dad."

Almost 90% of the students were able to identify one or more criteria they would use in deciding which shirt to purchase, and all of these responses showed good reasoning. That is, the responses indicated that the students would buy shirts that matched their appearance or style preferences, that fit them well or looked good on them, and/or that were well made or reasonably priced. As a set, these responses showed more emphasis on the shirt's appearance, color, or decorative design or logo, and less emphasis on its quality or price, than a comparable set of responses from adults might show. Otherwise, however, all of the students' responses (including all of the rare and unique responses) reflected valid assumptions and good reasoning about the decision making involved in purchasing a shirt.

In general, although the older students gave more and somewhat better reasons to explain their choice of store at which to purchase a shirt and their choice of shirt to purchase, all of the

students who were able to respond to these questions gave sensible answers. The vast majority of the substantive responses were relevant to the questions and reasonable as responses to it, and no misconceptions were in evidence. Significant relationships with grade level, SES level, and gender were infrequent and unremarkable except for the finding that more higher achievers than lower achievers were unable to explain their choice of store beyond saying that it sold shirts/clothes.

The Manufacture of Shoes

Questions 19 and 20 focused on students' knowledge about shoes. Question 19 asked what shoes are made of:

Question 19. Along with our clothes, we wear shoes. What are our shoes made from? (If student says "Leather," ask What is leather?) . . . Are there other shoes that are made out of different materials?

Question 20 asked about the manufacture of shoes. Because there are many different kinds of shoes made of many different materials (as the students' answers to Question 19 attest), we wanted to focus the students' attention on a particular type of shoe, so as to maximize the comparability of their responses. Consequently, in the process of asking Question 20 we showed them a photo of a man's black dress shoe (Appendix C). The question asked students to describe the steps involved in manufacturing such a shoe:

Question 20. (Show picture of shoe.) How do you think this shoe was made? What was the first step? . . . Then what?

Statistical information developed from students' responses to these questions is presented in Sections G, H, and I of Tables 7 and 8. All but 21 of the students were able to respond when

asked what shoes are made of. The most popular response was leather (119), broadly defined to include suede, snakeskin, alligator skin, etc. Other common responses included fabric (material, cloth, soft stuff, wool, sewing, etc.) (97) and rubber (62). Less frequent responses included plastic, styrofoam, or polyester (43), string or laces (37), wood (29), metal (28), other valid responses (velcro, hard material for the sole, etc.) (21), and incorrect responses such as paper or feathers (10). All but the last of these categories of responses could be considered accurate. In addition to prototype shoes consisting of leather uppers and rubber soles, many of the students' shoes were made from plastic or fabric, and many of these had soles or heels made of wood (or cork or other material that the students may have taken to be wood). Most shoes had laces but some sneakers had velcro fasteners. Even "metal" was a valid response because many children's shoes have metal eyelets and many athletic shoes have metal cleats (this was noted by many of the students who included metal among their responses).

In general, then, even though the students' responses included a much broader range of answers than the prototypical "leather," almost all of them were accurate. That is, the materials they mentioned were in fact components of particular types of shoes that the students were thinking about in giving their answers.

Students who mentioned leather were asked what leather is. Almost half (49) of these students correctly said that leather is animal skin, cowhide, deerskin, etc. However, 35 of them could not respond and 19 made incorrect responses (saying that leather is made from rubber, wood, or some substance other than animal hide).

Concerning steps in the manufacture of shoes, 32 students were unable to respond. The rest produced responses that focused on four main steps in shoe production. The first, processing raw materials by tanning hides, cleaning or softening leather, processing rubber or plastic to the

right degree of hardness, etc., was mentioned by only 12 students. Subsequent steps were mentioned by majorities of the students who were able to respond to the question: measuring/cutting/fashioning the parts of the shoe (103), sewing, gluing, or nailing the parts together to form the basic shoe (160), and then adding extras including laces, bows, buckles, polish, designs, labels, etc.(125). About half (92) of the students who were able to respond mentioned both of the key steps (fashioning the individual parts of the shoe and then sewing, gluing, or nailing them together to form the shoe).

The following examples are representative of the responses from students who varied across grade, SES, and achievement levels.

A. Kindergarten Students

1. Lance (low SES, low achiever)

19. Along with our clothes, we wear shoes. What are shoes made from? Maybe wood. (Are they made out of anything else?) Plastic.

20. How do you think this shoe was made? What was the first step? My shoes were made out of wood. (OK. What was the first thing they did?) The man put the shoes in wood.

2. Denise (average SES, average achiever)

19. Along with our clothes, we wear shoes. What are shoes made from? Wood. Do you know how I know? (How?) They have a little game on the computer and in a little book you can see people in it, and um . . . you can do it. And in the book I saw the little guy . . . he carved wood. (And made a shoe?) Yeah. (Are shoes made out of other materials?) I don't know. (Well, look at your shoes. Are your shoes the same thing as mine?) No, mine are made out of threads up here. That's all I know. (Are the bottoms the same?) No, cause they're harder and they're made of wood too.

20. How do you think this shoe was made? What was the first step? I don't know. (What would be the first thing they'd do?) They would find a little book of a shoe and then they'll put it on. (Why would they want a little book?) Cause then they could see how they make shoes.

3. **Luke** (high SES, high achiever)

19. Along with our clothes, we wear shoes. What are our shoes made from?
I don't know.

20. How do you think this shoe was made? What was the first step? Getting the stuff to make it. (OK, that's the first step. What's the next step?) They had to . . . they had to sew it and then they had to put the bottom part on. (How'd they do that?) They had to have like a hammer and nails and pound it in. (Then what did they have to do?) Then they had to put this part [tongue] on it. (Then what'd they have to do?) Then they had to put these little holes in it. (Then what did they have to do?) Then they had to put the price tag on it. (Then what did they do next?) Then they put it in the store. (How'd it get to the store?) A truck comes and gets boxes of shoes and it takes them to the store.

B. First Grade Students

1. **Heidi** (low SES, low achiever)

19. Along with our clothes, we wear shoes. What are our shoes made from? Wood. (Anything else?) [no response] (Look at your shoes. What do you think they're made of?) I think this is made out of leather. (What is leather?) Leather is like cowboy boots or a belt. That's all I know.

20. How do you think this shoe was made? What was the first step? Took the leather, then they . . . I think they took the leather, then I think . . . they might have took a belt off maybe a person's belt or something, and they're going to make it little on the machine and make the little buckle. (So what else would they do?) I don't know. Maybe they'd put the tag in it. Maybe it's made at Meijer's. (Do you think these shoes are all one big piece of leather?) No. (You think they're separate parts. How are they fastened together?) I don't know.

2 **James** (average SES, average achiever)

19. Along with our clothes, we wear shoes. What are shoes made from? Probably they take some fur from any animal and they put it inside the shoes and they put this stuff hooked on the outside of the shoes so the inside of the shoes will feel good. And also the shoes would be nice and hard so nobody could damage our feet. (Are there shoes made out of other material?) Probably shoes are made out of other material . . . like some shoes are sandals and they got flat bottoms.

20. How do you think this shoe was made? What was the first step? Probably people took the bottom part . . . they took a animal and then they cut around it and made the bottom part and then they took some more apart and then they hooked it up and then they put this furry stuff all on the inside and then they put this belt, the black belt and hooked it through it and then took this metal belt and hooked it.

3. **Anna** (high SES, high achiever)

19. Along with our clothes, we wear shoes. What are our shoes made from?

Sometimes they're made from cloth . . . and leather and silk sometimes. (Look at my shoes. What do you think they look like they're made from?) Cloth.

20. How do you think this shoe was made? What was the first step? This hard kind of cloth. (Well, what did they have to do first?) They had to sew them together and they had to put the tack on and they had to sew this (the buckle) on. (Anything else?) They had to put the tongue on.

C. Second Grade Students

1. **David** (low SES, low achiever)

19. Along with our clothes, we wear shoes. What are our shoes made from? I don't even know what mine are made out of. The bottom part is made out of rubber. (What do you think the top is made out of?) Rubber.

20. How do you think this shoe was made? What was the first step? They had to design it and stuff and paint it, and let that stuff dry. They had to make tongues for the shoes to pull them up and tighten them--the strings. They had to make strings. If you don't have strings, how you going to tie your shoes. Your shoes would be falling all off your feet. (Is that the last thing or are there other things they had to do?) See, your shoes, they had to make them good, and if they was the right size, they would fit you. They wouldn't be flapping off your feet every time you walked. They got a toe holder right there and it holds your feet.

2. **Tanya** (average SES, average achiever)

19. Along with our clothes, we wear shoes. What are our shoes made from? Some shoes are made from like leather. (What is leather?) Leather is a type of cloth that you can buy at a store. (Are they made out of any other kinds of material? Look at your shoes.) They're made out of jeans material. (All right. What else?) They're made out of thread.

20. How do you think this shoe was made? What was the first step? They got . . . it looks like they got a little needle and . . . in all sizes and like poked them in there . . . little holes, and then they finished the rest of the shoe. (How would they finish the rest of the shoe?) They'd put . . . (Is the top of the shoe the same piece of material that the bottom is?) No. (Well, how do they get them attached?) They have like a machine, I guess, to make that attached to the top. (All right. Then what?) And then they get some buckles and put it on the top. (OK, then what?) Then they put the inside of the shoe in there.

3. **Mike** (high SES, high achiever)

19. Along with our clothes, we wear shoes. What are our shoes made from?

Leather, and the bottom part is usually leather. (What is leather?) It's animal skin. It usually comes from deer and . . . I don't know. (Are there other shoes that are made from different materials?) Yes. Some are made out of a material that's made out of really thick string.

20. How do you think this shoe was made? What was the first step? Leather, and a little buckle. (What was the first step in making that shoe?) Getting the leather and shining it. (Then what'd they have to do?) Then they had to shape the shoe and cut out the pieces and put it together--sew it together.

D. Third Grade Students

1. **Jason** (low SES, low achiever)

19. Along with our clothes, we wear shoes. What are our shoes made from? Suede. (What is suede?) Leather inside out. (What is leather?) I don't know. (Where do we get leather? What is it made out of?) I don't know. . . . Cows. (What part of the cow?) Skin. (Are there other shoes that are made out of different materials?) Plastic (What other?) I don't know.

20. How do you think this shoe was made? What was the first step? Getting the leather. (Then what did they do?) Put it in a machine. (What did the machine do?) Make it. (What are some steps that had to be done?) Put the sole on the bottom of the shoe. (How do you put the sole on?) Sew it. (What else did they have to do?) I don't know. (How did they finish the shoe off?) Put the buckle on it. That's all.

2. **Kevin** (average SES, average achiever)

19. Along with our clothes, we wear shoes. What are our shoes made from?

Probably leather. (What is leather?) I have no idea. Some shoes are made in China. Mine are. (OK. Some shoes are made out of leather. Are there other things that shoes are made out of?) Yeah, but I don't remember what they're made of. (Well, look at your shoes. Look at mine.) Probably . . . I forgot the name . . . like um . . . not silk. I still have no idea. All I know is that I have no shoes that are made out of leather.

20. How do you think this shoe was made? What was the first step? Size them.

(What do you mean "size them?") Like put a thing that looks like a foot but it's not--it's a flat thing. It's a foot but not a real foot, and they like put it in there and cut the material that it's made out of around like that, and probably get more stuff and you put it around it and get more leather, not a whole lot, probably a little bit, and probably make designs in it, then sew it right down here at the bottom where it's all sewed because there's leather going down to make it tightly made so the bottom will stay on . . . the top will stay on to

the bottom like that. (Then what?) Then they give it to the shoe salesman and they put it in the store.

3. **Carlie** (high SES, high achiever)

19. Along with our clothes, we wear shoes. What are our shoes made from?
Materials and rubber.

20. How do you think this shoe was made? What was the first step? I think they made plastic, like melted stuff, and made . . . not plastic, but this certain material--I forget what it's called and they put it around here [the top]. . . .They put it around that and then with the bottom, they melted stuff to make rubber --they have to melt the stuff, and then they put it . . . they attach it to the shoe.

Grade Level Differences

Data in Tables 7 and 8 indicate that 15 of the 21 coding categories derived from responses to Questions 19 and 20 showed statistically significant relationships with grade level. More younger students were unable to respond to these two questions, whereas more older students were able to generate one or more valid responses. In addition, nine of the 10 students who made incorrect responses to Question 19 were kindergarteners or first graders, as were about two-thirds of the students who never mentioned leather. More older students than younger students were coded for more of the categories reflecting valid responses: identifying leather, wood, rubber, plastic, or laces as what shoes are made of; knowing that leather is animal hide; and identifying processing raw materials, fashioning individual parts, and combining the parts together as steps in manufacturing shoes.

The single nonlinear relationship with grade level was for stating incorrectly that leather is made from rubber, wood, or something else other than animal hide. This response was coded least often for kindergarteners but most often for second graders, with first- and third-graders in between. We hesitate to attempt to interpret this distribution, both because small numbers of students were involved and because different numbers of students in each group were asked this

question (i.e., only those who mentioned leather). Overall, the data indicate a pattern of increasing knowledge about shoes and shoe manufacture as students progress through the K-3 range.

Socioeconomic Status, Achievement Level, and Gender Differences

Whereas 15 of the 21 response categories for Questions 19 and 20 showed statistically significant relationships with grade level, the corresponding numbers were only two for SES level, five for achievement level, and three for gender. The SES relationships indicated that higher SES students were more likely than other students to know that leather is animal skin and to speak of sewing, gluing, or nailing the parts of a shoe together to form the whole (although the latter category also showed a nonlinear relationship because middle SES students were the least likely to mention this step in shoe manufacture).

The significant relationships with achievement level all followed the expected pattern. They indicated that higher achievers were more likely than lower achievers to mention leather as a shoe component, to know that leather is animal hide, and to talk about fashioning the individual parts of a shoe and adding extras to the finished basic shoe as steps in shoe manufacturing.

The gender differences indicated that 19 boys but only 9 girls mentioned metal as a shoe component. This difference appeared because most of the boys who mentioned metal were thinking of the cleats on sports shoes. There was also a gender difference in knowledge about leather: 30 boys but only 19 girls correctly identified leather as animal hide, whereas only 6 boys but 13 girls incorrectly stated that leather is made from some other substance. This difference was mildly surprising; we know of no reason to predict that boys would know more than girls about leather.

Relationships Among the Response Categories

As usual, categories that showed the clearest progressions with grade level tended to correlate with one another and with categories from other parts of the interview that represented more sophisticated responses to the questions. Otherwise, there were no noteworthy associations between response categories for Questions 19 and 20 and response categories for other questions. This was not surprising, because Questions 19 and 20 focused on shoes whereas all of the other questions focused on clothing.

Rare and Unique Responses

The following responses to Questions 19 and 20 involve interesting elaborations on the ideas represented by the coding categories or embody ideas not included in those categories.

What Shoes Are Made Of

Kindergarten: Glass; paper; gold (decorative on a woman's shoe); something hard that's good to run and jump on; silk; cardboard; velcro; a whole bunch of colors; hard material (2). In addition, one kindergartener spoke of reading in a book about a man carving shoes from wood and another thought that leather uppers are made by cutting up old belts.

First grade: Beads; stone, feathers; spongy stuff (cork); hard chemicals (which the child called clistrium) [calcium?]; tar, tape, glue and metal; silver (a buckle); cardboard that can bend; velcro; feathers; gel.

Second grade: Lights (the student had lights on the back of her shoe); hard stuff for the bottom; velcro; beads (on moccasins); hard stuff—maybe clay.

Third grade: Feathers; rope (student claimed to have a pair of rope shoes); wax; velcro (2); hard material for the sole.

What is Leather?

Kindergarten: (none).

First grade: Like cowboy boots or a belt; suede is a fabric; some type of cloth; from snakes; alligator skin; buffalo skin; animal skin; snake skin; maybe from glue or fabric stuff; shoemakers make leather; people in stores buy stuff to make leather. Finally, one first grader stated that “I looked this up in the dictionary: It’s made out of animal skins.”

Second grade: Cotton; cloth (3); tough cloth; rubber and tar mixed together and dried until it is hard; paten is a kind of thread and leather is like paten but feels weird; a type of skin made out of wax; it comes from animals—they have “skin” on the other side of their fur. One second grader distinguished snake skin from leather, which is “furry.” Another mentioned alligator skin and distinguished it from leather but could not explain what leather is or where it comes from. Finally, one second grader spoke of a kind of string that is made into leather, then dyed and softened (i.e., leather as a fabric).

Third grade: Like blue-jean shoes; a special kind of rubber; snake skin; distinguishes leather from crocodile and snake skin but cannot explain what leather is (4); material (unexplained further) (2); material made at a leather company (could not say from what); says that leather is animal skin but then says maybe a plant could be leather too; describes leather as bear or deer hide and distinguishes it from alligator skin.

Steps in Shoe Manufacture

Kindergarten: Talks about adding insoles and laces to an already-existing shoe; “get the blue and paint it;” dye the leather (before beginning shoe construction). One kindergartener thought that a shoe is a single piece of leather cut or otherwise formed into a pattern without sewing.

First grade: Shoes are made from belts—they get leather from the belt and they use a machine to make the belt buckle “little” enough to serve as a buckle for a shoe; they weave it and then put something soft inside it; they use machines to make shoes (this was one of several students who mentioned machines in a way that suggested magical explanations).

Second grade: They dye the leather before making the shoe; they put a thing on it so you can change it to your size if it doesn’t fit (not explained further).

Third grade: Says that shoes are made from silk, then describes how they pick cotton and put it into a machine that turns it into silk (apparently talking about canvas or other material for sneakers); thinks that her shoe was made by coloring a “plain old shoe laying around;” includes the step of making sure that the shoe is the same as its intended mate (also says that in Japan they have silk shoes, where silk is used on the outside in the way that we would use leather here). One third grader knew a lot about shoe manufacturing because her aunt worked in a shoe factory and the student had visited her on the job.

In addition to the responses quoted above, many students talked about getting “soft stuff” inside the shoe for foot comfort. Also, several referred to getting the sole the right size. Some talked about using templates, others talked about stamping machines or other means of mass producing shoes in the size. Some spoke of a metal thing (a last?) that is used to size the sole and then cut the sole by cutting around the metal thing. The students often inspected their own

shoes as a way to develop ideas for answering these questions. Many of them wore sneakers or simple sandals, so they never mentioned leather. Finally, many students referred to punching holes in the shoes for the shoe laces, but we did not include this as a separate coding category.

Discussion

The students' responses concerning shoes are parallel in many ways to their responses concerning clothing. That is, although a substantial majority of the students were able to respond accurately to initial questions about the nature of clothing or shoes (i.e., clothing is made of cloth, silk, cotton, material, etc. and shoes are made of leather, fabric, rubber, etc.), only a minority could respond accurately when these initial responses were probed for deeper understanding (i.e., cloth is woven thread and thread is spun from raw material, leather is processed animal hide). The students' responses were less clustered around the prototype notion of the shoe as composed of a leather upper sewn to a rubber or hardened plastic sole than comparable responses by adults probably would be. This reflects the fact that most children's shoes do not conform to this prototype, particularly with respect to the uppers (fabric in sneakers, plastic for many types of girls' shoes). With just a few exceptions (paper, cardboard, feathers, tar, tape, clay, gel, and wax) the students' responses concerning what shoes are made of were clearly accurate, at least for some types of shoes. Even most of the listed exceptions might be considered accurate if more were known about what the students meant by some of these terms and what types of shoes the students had in mind in using them.

The students' responses concerning the nature of leather were less impressive. Only about half of the students mentioned leather, and only about half of these understood that leather is animal hide. Many of the students who mentioned leather could not explain what it is, and

some of those who did struggle to explain communicated misconceptions (e.g., leather is a type of cloth, it's made from glue and fabric, it's made from rubber and tar, it's made from wax, it's made from string, it's a special kind of rubber).

Responses concerning steps in the manufacture of shoes were often vague but accurate as far as they went. Most students mentioned one or more of the steps of cutting the individual pieces, combining them together to assemble the basic shoe, and then adding laces, buckles, or other finishing touches. Clear-cut misconceptions were infrequent, although a few interesting ones emerged: the shoe is a single piece of leather rather than a product assembled by combining separate parts; shoes made by reprocessing the leather and buckles in old belts; and first one type of machine is used to manufacture a standard-sized shoe and then other machines are used to make these shoes larger or smaller to create additional sizes. Some of the students' descriptions of the actions of machines involved in shoe manufacturing were reminiscent of the "black box" or semi-magical explanations seen in their descriptions of the role of machines in manufacturing clothing.

Statistically significant relationships with grade level reflected expected progressions in students' knowledge. Significant relationships with SES level, achievement level, and gender were infrequent and unremarkable, except for indications that boys displayed both more accurate knowledge and fewer misconceptions about leather than girls. Overall, the students' responses concerning shoes tended to be accurate as far as they went, and incorrect statements tended to reflect good reasoning from a limited knowledge base rather than fundamental and systematic misconceptions.

What the Students Would Like to Learn About Clothing

The last question on the interview invited students to tell us what they would like to learn about clothing if they were to be taught a unit on the topic:

Question 21. Suppose that next week your teacher was going to teach you about clothes—clothes that people wear here and in other parts of the world, and what clothes were like in the past. If you were going to learn about clothes, what would you like to learn?

A minority of students (mostly younger ones) were unable to respond to this question. In addition, a few others said that there was nothing they would like to learn about clothing and several said only that they wanted to learn “everything” or “all” about clothing but did not specify anything in particular. However, the majority of students identified at least one thing that they would like to learn about clothing, and many identified more than one. Such substantive responses were supplied by 33 kindergarteners, 42 first graders, 47 second graders, and 49 third graders. These responses are summarized below.

Kindergarten: How clothes are made (11); what clothes are made from (3); how to sew and fix clothes so I could help people (if their clothes got broken, help them get the clothes fixed, and if their shoes came unlaced, fix it for them); a princess wears clothes and Indians don’t wear clothes, or wear Indian clothes; about pretty clothes; why people wear clothes; how clothes get to the store; what people wear all over the city—what color and what kind of places; how to dress myself . . . I mean how to dress my baby and my wife when I have a kid; if girls now can wear pants; how they make the colors so pretty; why people should have lots of clothes; how I get clothes; what they wear in other states and how some of them look; about shorts; about clothes that are fancy and special; about all the different kinds of clothes; about what colors they are; if they look cool; how the threads were made and how the cardboard was made that you put under

the clothes in the store; what different shapes they are; that some people wear different clothes; that people like clothes and wear them a lot, so they get old, like my shirt and jeans; how they put the letters on shirts that have letters on them; what clothes in the past were really made out of and how they took them to the stores; how they make the yarn to put clothes together; why they get sold in stores.

First grade: How they are made (19); what they are made of (5); how they make it out of thread, how they make it out of silk, how they make bags and yarn, and how they make a blanket; that they're nice and pretty and have pretty colors; about shoes; how they make these square things and put these bumps on (pointing to features of her own clothing); what clothes looked like in the past and in other parts of the world; about clothes that we don't wear but some people wear, and maybe how they would use their clothes; about the designs they put on clothes—sports and all that; how they get the stuff to make clothes and how they design them real good; why they have Power Rangers on shirts; about sweatshirts; how they put zippers on and how they make the clothes into a different color from the color they got it from; if I were a shoe salesman, I would want to make them very tough so they would last a long time; about clothes in the past and today; about clothes in the past and different kinds of clothes that we don't wear; about my right size clothes (what her sizes are) and about girl clothes (what different kinds there are); where are the factories that make clothes and what kinds of machines do they use to make them; about fancy clothes; about clothes a long time ago; about the shapes that they're in and the things that they're like; about styles of clothes and clothes that are cool right now and are not cool right now; about what those needles are called and how they made the wool into those big wool threads; if clothes are made out of animals and if all these dresses are made out of cloth and if the dresses are made out of cotton; what other people besides us used to wear

in the olden days; how they get it to look like a real shirt—how they cut it like they want it; where clothes come from; how people wear them; how they put the pictures on; how they sew it together; how clothes would be important if they had a special purpose, more purposes than we are learning about in school, and why clothes are more expensive and how the tags are made; how long it takes to make them; about clothes for people that don't have any, whether people give clothes to them or buy clothes for them, and where people in the past got their clothes and if they had places to buy clothes.

Second grade: How they are made (29); what they are made of (7); how they make this kind of clothing smooth like that (pointing to his own shirt) and how they make shoes and socks; what clothes looked like in the past and what color they were; about jogging pants—some of them are thin (spandex?); how they get the designs on them, get the different kinds of yarn, and get the color they need; how thread is made, how cloth is made, and who makes the cloth; how many clothes are in the whole world and how many animals they take them off from; how people in Mexico would dress or wear clothes, and maybe what they would put on first, like their underwear or socks or undershirt or pants; about old clothes from the past, because my great-grandma used to have old clothes but I never got to see them, and to learn where it is made and what it is made out of and who wears it and when it was made; about differences in clothes from today and the past, and what other people other than the natives wear; about how Indians and Africans make their clothes; what kinds of machines make clothes; where clothes are made; how the sewing machine gets to do all those clothes in one day, how the fabric is, and how they get the dyeing put on it; if you could take clothes and make them into something else, like if you could get rid of a little teddy bear on your shirt or add a design to a sweater; where they get special stuff to make them, like if you had lighting-up shoes, how you put the light in them and

then put stuff around it so it won't fall out; where they get the stuff to make clothes; about clothes from the past; the answers to questions that I couldn't answer (about how clothes are made and what shoes are made of); how other kinds of people wear their clothes, like in Canada and Mexico; how clothes keep you from wind and storms and stuff; how people get the stuff to make clothes; how they made the design; what clothes were like a long time ago, like 300 B.C., and about clothes in different parts of the world; what kind of factories make them and how they have different clothes in Mexico and stuff, how people find clothes, and who first thought up clothes; what they look like, how old they are, and if anybody likes them; how they make clothes in different parts of the world and why they're different; how they send the clothes to stores and put them in the right order at the store; what clothes look like in other parts of the world and if there are some different clothes that I didn't know about and different kinds of shoes; why people have clothes and what they do with them; about clothes back then and clothes right now; how they get the strings to make clothes and get the pretty colors to color them; maybe about other countries like Russia, Brazil, Japan and stuff, to see all their clothes and then look at our clothes and see how different they are; how they make basketball jerseys and regular shirts, like if a machine does the design on a shirt or is it by hand; more about how clothes help you and stuff like that, and if some of them are different; where you can make them and how people make them in an easier way, and see how you can adjust a thing or how they fit without having to try them on or hold them up against you; why different people wear different clothes, and also about shoes, how they attach the shoes together; what the machines are like that make clothes; where they are made and the styles of different countries; how they get the materials and how they know what size it is; who invented clothes and if I was right in my guesses about how they get the shape they design. In addition, one second grader said that she would like to go on a field

trip to a clothes factory to see how clothes are made and also learn how they are shipped and where they get the wool and leather and other raw materials.

Third grade: How they are made (21); what they are made of (8); what state they would come from and how you would make them different; how many there are in the world and how much each piece of clothes is; how they change; where they are made and how old they are; what the materials are like; what different kinds are made from; how they put buttons inside, and how they put color on it; what kinds of clothes there are; what they were made of 100 years ago and how they get their clothes in places like Alaska, where they have hoods; how they put the leather on shoes; how they made the big heel push up and then curve down (talking about a particular kind of shoe that she likes); where they get the material; what different countries make clothes and if all countries make clothes or not; what they were for, what they were made of; about different places and how they wear clothes there, how thread is made, and how other people look in our dresses and pants and how they think we look in the clothes that they wear; where they come from when they ship them to the U.S., what the plants are called, what the hard material is to make the top part of a shoe, what the rubber is made from, and how they get the plastic to go on the shoe string; to see how they made clothes in old times, what they did with the clothes then, and if all the clothes then had tags on them; how they make yarn and how they make buttons on pants or shirts; what people wore in the past and in different states; who thought of clothes and how hard it is to make them; who wears them, where they come from, and what sizes they wear; about clothes they wear in different countries and how people make clothes at factories and how they get some of the dirt out (do they just pick it out or does some machine do it—referring to the processing of raw cotton); how they put designs on shirts; how long we have had clothes, when they were invented, who invented or discovered them, and why they were

made; about Chinese clothes (explains that her Chinese-American friend has told her about how they wear clothes to please the spirits in China, but has never showed her her Chinese clothes); how they made clothes in the past; how clothes are made from cotton and stuff like that and how they make the colors; what people wear in other states and countries and what they wore in the past; how they first began to make clothes, how they design them, and how they sell them at stores; where clothes are made and what shoes are made of besides cloth and leather and rubber; about clothes in Saudi Arabia and Mexico (has heard that in Saudi Arabia they wear “these white things that come down around their heads and what looks like blankets but it’s not,” and knows that they dance and have ceremonies in Mexico and would like to know about the clothes they wear for this); where the things that clothes are made from come from; how they get the designs on clothes; what people wear in other states, like Australia, India, and Africa in the jungles (notes that she has only seen clothes in Chicago, Michigan, California, and Ohio); what clothes are like in other places; how clothes keep you warm, how they make the colors into them, and how shoes are always so furry on the inside; what clothes they wear in other parts of the world and if there are special kinds of clothes that people have to wear when they do certain things; about clothes that people wear in other countries, where they get them from, and what they wore a long time ago; what kinds of clothes people wear; why they have to get shoes from animals and can’t make them just like from string (is concerned about the killing of animals); how clothes just usually stay for a long time the way they should be without tearing up, and where they get the materials to make clothes; what clothes will look like in the future and what some of the clothes looked like in the past; where they get the stuff to make clothes; the kinds of clothes that people wear in different countries and why they wear them (do they wear them because they like them or because they think it’s good to wear them even though they don’t like them); where

clothes are made; what clothes are made out of in other parts of the world; what clothing styles are in each country and what is the most popular kind of clothing. In addition, one third grader made the following lengthy response: "What clothes they wore in the Indian days, especially about the heavy clothes they wore in cool parts of the country, and how they made it, how they put it on the thing they made it with and tore the skin off and stuff like that. For the warmer part of the country, I'd like to learn about clothes that they wear, what the designs on the clothes are like, because they might have different TV shows and stuff like that. I would like to see what they make in different countries like California."

Discussion

The students' responses concerning what they would like to learn about clothing paralleled the responses obtained to a similar question at the end of our interview on shelter. That is, most of the students were able to generate at least one substantive response and the most popular responses focused on manufacturing issues (how homes/clothes are made and what they are made from) and desires to learn more about homes/clothes in the past or in other cultures. Most of these responses reflected issues raised in the interview, especially questions that the students were unable to answer.

Most students phrased their responses rather generally, but a few homed in on highly specific issues. Some of these involved getting explanations for aspects of clothing that the student viewed as mysterious or difficult to accomplish (putting zippers into clothes, mass production of clothing, how clothes are put into the right order when they reach the store, how shoes are attached together, how curved and tapered heels are made and then attached to women's shoes, how they get the plastic onto the ends of shoelaces, and how they clean the dirt

out of the raw material). In general, the students' responses indicated that they were curious and interested to learn more about clothing and shoes.

General Discussion

To our knowledge, this has been the first systematic investigation of children's knowledge and thinking about clothing. The findings indicate that the students possessed both more knowledge and fewer misconceptions about clothing than they did about shelter, probably because most of what there is to know about clothing is less complicated and more transparent than much of what there is to know about shelter. Even so, our findings provide more evidence that primary-grade students' knowledge and thinking about cultural universals is quite limited, mostly tacit rather than well-articulated, frequently distorted by misconceptions, and scattered rather than well organized into coherent networks structured around big ideas (especially cause-and-effect connections that support meaningful understandings). The findings provide further support for our claim that children typically do not acquire all, or even a significant portion, of what is worth knowing about cultural universals through everyday experience.

More than 90% of the students understood that clothing is a fundamental human need. Although high, this percentage represents a drop from the 100% of students in our previous study who recognized shelter as a fundamental human need. In this study, 12 students said that clothing is not actually needed and another 8 said that the need depends on the climate in which the person lives. The rationales that the students gave in explaining their answers help us to understand why some of them viewed clothing as an option rather than a need. Clothing has at least four noteworthy functions (protection, modesty, appearance enhancement/decoration, and identification with a social group or cultural reference), but the students' responses were focused

almost exclusively on the first two of these functions. A heavy majority of the students mentioned protection and almost half mentioned modesty, but only 10 mentioned appearance enhancement/decoration and only one even hinted at the notion of identification. Furthermore, the “protection” responses were concentrated on the notion of protection against cold. This idea was expressed by 153 students, whereas only 35 spoke of clothes providing protection against dirt, sun, insects, or other hazards. Many of these students thought of clothing only in terms of protection against cold, so it is not surprising that some of them would view clothing as unnecessary in warm climates. These findings suggest that K-3 students need clarification that people wear clothing in all societies and climates, because clothing serves several functions in addition to protection.

Except for the kindergarteners, the students showed generally good knowledge and thinking about the nature of and reasons for different types of clothing. Most of them understood that business people “dress up” relatively formally because they want to look professional to the public in general and their business clients in particular. Even more of the students accurately described work clothes as old, worn clothes that we do not mind getting dirty, as heavy clothes that provide protection, or as uniforms. Explanations for why people wear work clothes included protection of the workers (and their other clothes) from dirt, grease, etc.; identification of the workers to the public as employees of the company; and specific aspects of certain kinds of work clothes that facilitated the worker’s ability to do the job (e.g., tool belts, hairnets, etc.). Only 10 students spontaneously mentioned uniforms in talking about work clothes, but most were able to explain one or more functions of uniforms when asked why some workers wear them. Finally, almost all of the students were able to describe play clothes accurately and explain that these

tend to be informal clothes that are washable and worn because they are soft, comfortable, and easy to relax in.

In general, even though the students usually lacked precise vocabulary for describing business and work clothes, most of them were able to make accurate statements about the nature and functions of business clothes, work clothes (including uniforms), and play clothes. These findings indicate that K-3 students are able to draw on tacit knowledge of transparent features in order to draw comparisons of different forms of clothing and their respective functions, even when they don't understand more basic "land-to-hand" connections and causal relationships that underlie what is visible to the eye. Similar findings emerged in our shelter study, in which students generally made many valid statements in the process of comparing and contrasting different types of housing, even though most of them lacked understanding of the geographical and cultural reasons why the different forms of housing were constructed by the people who lived in them.

The fact that the students' knowledge about clothing was mostly limited to transparent surface features became apparent when the interview questions shifted from types of clothing to the nature of cloth and thread. Here, even though a majority of the students made correct statements about the plant or animal sources of clothing (e.g., wool, silk, cotton, etc.), only about a fourth of them understood that cloth is a fabric woven from thread or yarn and only an eighth of them understood that thread or yarn is spun from its raw material. Furthermore, probing revealed that many students harbored misconceptions about the nature of cloth or thread. One common misconception that appeared to be held by half or more of the students was that cloth is a solid akin to soft plastic, rubber, or paper. Some of these students expressed this notion directly in talking about machines that iron or flatten fluffy cotton. Others were vague about

how cloth is manufactured but talked about making clothes by sewing together pieces of (presumably solid) cloth. Concerning the nature of thread, most of the students who did not know that thread is spun from raw material were unable to explain at all, but 44 thought that thread was (or was made from) found material such as hair, string, or “what silkworms produce.” Concerning both cloth and thread, some students could only suggest a recycling notion (new cloth is made from old clothes, socks, etc.; new thread is obtained by cutting up or unraveling already-existing cloth).

Thus, even though the students were familiar with different types of clothing, most of them were vague or confused about the nature of cloth itself. The majority who did not realize that cloth is woven fabric had to “reach” from what they did know in order to generate explanations. Those who knew that cloth is wool or cotton, for example, sometimes spoke of attaching the raw wool or cotton to a presumably solid substrate (without indicating what this substrate was). Students who knew that clothing is made from thread or yarn sometimes suggested a “knitting” model, envisioning the sewing of a garment from start to finish as one continuous operation, as opposed to assembling pieces and then stitching them together.

In summary, most of the students knew that clothing is a basic need and could talk about different kinds of clothing and why they are worn, but most did not know what clothing actually is. Lacking knowledge that cloth is woven, a majority envisioned cloth as a solid membrane (i.e., animal skin) or a manufactured substance (akin to plastic, rubber, or paper). Many understood that thread is used to stitch together pieces of cloth in manufacturing clothing, but most did not realize that the pieces themselves were woven from thread. Finally, the vast majority of the students, including half of those who understood that cloth is woven from thread, were vague or confused about the nature of thread itself.

The students' responses to questions about clothing in past eras tended to be accurate as far as they went, although many students were unable to respond and many others were confined to brief stereotypes, especially with respect to the clothing of cave dwellers. Most of the "accurate" responses concerning cave dweller clothing simply depicted the stereotype shown in the Flintstones and Alley Oop cartoons. Students who did not possess this stereotyped image tended to convey misconceptions, such as that cave dwellers' clothes were made from trees, rock, straw, or "junk found in rivers." Common descriptions of Pilgrim clothing reflected illustrations shown in history texts, children's literature, or movies and television programs about the Pilgrims. Descriptions of pioneers' clothing were more varied, although clearly influenced by the same kinds of illustrations. Some students guessed that the Pilgrims wore clothes given to them by the Indians, and some described pioneer clothing as army uniforms (for these students, the term "pioneer" apparently conjured images of the U.S. Army fighting Indians along the frontier, rather than non-military families developing homesteads). The students' responses concerning clothing early in the 20th century ("when your great-grandparents were children") were less stereotyped than their responses concerning the clothing of cave dwellers, Pilgrims, or pioneers. However, many students conveyed the idea that such clothing was rather drab, heavy, formal, and uncomfortable. In talking about the Pilgrims and pioneers and especially in talking about the early 20th century, many students called attention to rigid gender differentiation in clothing styles, especially the notion that girls and women had to wear dresses in those days.

Questions about improvements in clothing over time yielded a great many responses. In general, the students viewed modern clothes as improved over earlier clothes in every way. They tended to describe earlier clothes as sewn poorly and prone to fall apart easily, while depicting today's clothes as lighter yet stronger, better at keeping us warm, and softer and thus

more comfortable. Many also noted that today we have larger and more varied wardrobes that allow us to adjust more completely to seasonal variations in temperature and that we enjoy a much greater range of choices of clothes that are both more functional and more aesthetically pleasing than the clothes of the past. The students had only limited knowledge of the inventions that have brought about these changes. Only 25 percent were able to name even one invention, and this was usually the sewing machine.

The question about whether clothes are easier or harder to take care of today produced some interesting surprises. The majority of the students, as expected, said that clothes are easier to take care of today and cited modern machines, better fabrics, modern storage, better cleaning agents and numerous other valid reasons to support their opinion. However, a minority of the students said that clothes are harder to take care of today, and some of them supported this opinion by citing valid arguments such as that we have more clothes to keep track of today, we have higher cleanliness expectations in modern business environments, we have whiter/brighter colored clothes that are harder to keep clean, modern stains are more difficult to eradicate, and many modern fabrics are delicate and require special handling. For the most part, however, the students expressed clear preferences for contemporary clothing and clothing-related mores over those of the past. This was part of the pervasive presentism that has appeared in all of our studies whenever the students are asked to talk about the past or to make comparisons between the past and the present.

The students' answers to questions about modern clothing manufacture were relatively unimpressive. Almost 90% of the students were able to name one or more steps in the manufacture of a shirt or dress, and most of these responses were accurate as far as they went. However, the responses reflected the previously established facts that only about a fourth of the

students understood that cloth is woven fabric and only about an eighth understood that thread is spun from raw material. Thus, the majority of the responses focused on dyeing for color or adding finishing touches that create features that are especially noticeable to children (belt loops, buttons, pockets, designs and logos, etc.). Only 63 students mentioned weaving the cloth and only 10 mentioned spinning the thread as steps in the manufacturing process. The remaining students omitted these steps entirely or finessed them by communicating “black-box” theories that referred to machines “making” the shirt or dress but without specifying the steps involved. Most of these “black-box” explanations actually were more sophisticated than explanations based on the notion of an individual making the entire garment using nothing more sophisticated than a simple sewing machine, but most of them were vague about the nature of the machines or processes used in mass production of clothing. Along with additional evidence of the previously established misconception that cloth is a solid substance rather than woven fabric, answers to this question indicated that certain students believed that all garments of a given type are initially produced in a single size but then some of them are moved on to other machines for shrinking or stretching to create other sizes.

Only about half of the students clearly understood that their shirt or dress was probably machine-made at a factory. Furthermore, only 58 said that the factory was probably located where raw materials are plentiful (whereas 63 thought that it was made at the store at which it was purchased or somewhere nearby). Replicating a major finding from the shelter study, these data provide more evidence that K-3 students have little awareness of the geographic and economic reasons why particular types of human artifacts are favored in particular climates and locations. Some of the students did display glimmerings of understanding that geographical locations differ in their natural resources and societies differ in their degrees of economic

development, but none of them were able to generate specific explanations about why clothing is manufactured in particular places or why certain people have more clothing options available to them than other people.

Most of the younger students had trouble responding to the question about how people in other parts of the world dress differently than we do, but most of the older students answered it by generating climate explanations or culture/custom examples that were valid as far as they went. However, many of the valid-but-limited responses and even more of the misconceptions elicited by this question are troubling because they reflect stereotyped images of people in other countries, frequently accompanied by the ethnocentric suggestion that people in other places dress differently than we do because they do not have the knowledge or resources that we have. Several responses suggested incipient bias toward Mexicans, Africans, and even African Americans. These troublesome themes were more prominent in responses to the clothing interview than in responses to the shelter interview, perhaps because the students tended to attribute housing differences mostly to differences in access to resources, whereas at least some of them appeared to attribute clothing differences more to differences in style or preference. In attribution theory terms (Weiner, 1992), limited access to resources is an external and largely uncontrollable cause implying that the person is a blameless victim of circumstances, but personal style or preference is an internal and controllable cause implying that the person bears responsibility for the behavior in question. The descriptions that some of these students applied to “other people” in responding to this question (e.g., describing them as dressing “nasty,” “like teenagers,” or “weird”) suggest that they were making such attributions and associated moral judgments.

Only a few students used language that explicitly communicated a sense of moral superiority to people whom they identified as dressing differently. However, most students who did comment on differences implied a preference for the familiar and a difficulty understanding how people might prefer something different. A few students spelled out their preference and supported it with relevant arguments (especially students who noted that our clothes are more comfortable than clothes in the past or in certain contemporary societies, as well as students who noted that there are fewer restrictions on girls and women in the present compared to the past and in our society compared to certain others). In most cases, however, preference for the familiar was communicated implicitly through tone of voice or terms such as “funny little hats” used in describing how people dress differently elsewhere. The unspoken view of many of the students was expressed by the one who said that “unlucky” people don’t have clothes like ours.

The question about shopping for a shirt yielded sensible responses from the vast majority of students who were able to respond to it. Those who were able to say why they would choose a particular store cited quality, selection, and price—all good reasons. In explaining why they would pick a particular shirt to purchase, the students emphasized buying shirts that matched their style preferences, that fit them well or looked good on them, and/or that were well made or reasonably priced. These responses also showed good reasoning, although as a set they placed more emphasis on the shirt’s appearance, color, or decorative design, and less emphasis on its quality or price, than most adults would emphasize. No significant misconceptions appeared among these responses.

The students’ responses to questions about shoes paralleled their responses to questions about clothing. They were generally accurate in identifying the raw materials that shoes are made from, but only a minority knew that leather is animal hide and most explanations of the

steps in the shoe manufacturing process were vague, frequently relying on “black box” descriptions of the role of machines. Clear-cut misconceptions were infrequent, although a few students communicated such ideas as that a shoe is a single piece of leather rather than a product assembled by combining separate parts, shoes are made by reprocessing the leather and buckles in old belts, or shoes are first made in a standard size by one machine and then stretched or shrunk using other machines.

Finally, the students’ answers to the question about what they would like to learn about clothing mostly reflected issues raised in the interview, particularly desire to learn more about how clothes are made, what they are made from, and clothing in the past and in other cultures. However, certain students identified additional issues (especially about aspects of clothing that they viewed as mysterious or difficult to accomplish) and most students indicated that they were interested to learn more about clothing and shoes.

Grade Level, SES Level, Achievement Level, and Gender Differences

The coding categories yielded a total of 169 scores that were analyzed statistically. Of these, 100 (59%) yielded Chi-squares indicating a significant relationship with grade level, of which 94 (56%) suggested a generally linear progression across Grades K-3. The percentages of students who gave correct or more sophisticated responses typically rose from one grade level to the next. Grade level progressions for some variables departed from smooth linearity (e.g., scores for kindergarten students were notably lower than scores for the other three groups; scores for kindergarteners and first graders were notably low and scores for second and third graders were notably high; or scores for third graders were much higher than those for the other three

groups); but in general, scores for more sophisticated responses showed rising trends and scores for “don’t know” or less sophisticated responses showed falling trends across the K-3 range.

There were several response categories for which these trends failed to reach statistical significance when they might have been expected to do so, but none for which the Chi-square analyses indicated that younger students’ responses were more complete or sophisticated than those of older students. A seeming exception to this generalization was the finding that third graders were more likely to give black box explanations for the clothing manufacturing process, whereas younger students were more likely to talk about sewing, stitching, or knitting cut pieces together to form the garment. However, examination of correlations with other responses indicated that the “black box” explanation was associated with a generally sophisticated pattern of responses to the interview as a whole. We believe that, rather than indicating regression in the thinking of third graders, this explanation indicates that the students who gave it had moved beyond the image of an individual making a garment using a simple sewing machine to some level of understanding that garment manufacture in factories involves mass production and more complicated machinery (although they had not yet developed clear images of the processes or machines involved).

As shown in the tables, the group difference analyses for each cluster of questions tended to yield the same general pattern that included the following four key features: (1) noteworthy and usually statistically significant progressions across grade level for a majority of the response categories, especially those that reflected knowledge rather than mere personal preferences; (2) progressions across SES- and achievement-level groups that were similar in pattern to the grade level progressions but usually much smaller and not statistically significant; (3) occasional

statistically significant but nonlinear patterns that usually were not easily interpretable; and (4) few statistically significant gender differences.

Only 33 (20%) of the Chi-squares reflecting relationships with SES level reached the .05 level of statistical significance, and of these only 21 (12%) reflected linear progressions. The linear progressions were all in the expected direction, indicating that higher SES students made more sophisticated responses and lower SES students made less sophisticated responses. The 12 statistically significant but nonlinear relationships with SES level indicated that the middle SES students were coded either notably more frequently or notably less frequently in a category than were the lower and higher SES students. However, these 12 relationships did not fall into any pattern suggesting that the responses of the middle SES students were consistently more sophisticated than, less sophisticated than, or otherwise different in some particular way from the responses of the other students.

Higher SES students were more likely to say that people need clothes to protect them against cold or against dirt, sun, insects, or injury; to describe work clothes accurately; to say that clothes are made from wool or animal skin; to know that cloth is woven or knitted from thread or yarn; to know that thread is spun from raw material; to provide accurate responses concerning pioneer clothes and clothes of the early 20th century; to say that today's clothes are improved because they are more aesthetically pleasing, to say that clothes are easier to take care of today and attribute this to washers, dryers, or other machines; to mention processing of raw material as a step in manufacturing a shirt or dress; to suggest that their own shirt or dress was made in a factory located where raw materials are plentiful; and to know that leather is animal hide. These responses are part of the general sophistication pattern running throughout the interview that is associated more closely with student grade and achievement level than student SES level.

Consequently, the pattern appears to reflect differences in amounts of general information held as prior knowledge rather than more specific home background experiences related to social class. Thus, in both our shelter and our clothing studies, only small percentages of the Chi-squares for SES level reached the .05 level of statistical significance, and the patterns for the three SES groups were generally much more similar than different. This suggests that the students' knowledge about topics addressed in our questions was shaped more by their common learning at school and exposure to contemporary U.S. media and culture than by contrasting socioeconomic aspects of their home backgrounds. At least within the range of SES backgrounds included within this study, there is no evidence of strikingly contrasting patterns of knowledge within contrasting SES subgroups.

Analyses of relationships with achievement level indicated that 45 (27%) of the 169 Chi-squares reached the .05 level of statistical significance, and of these, 43 (25%) reflected linear progressions. With one exception, all of the linear progressions were in the expected direction, indicating that higher achieving students made more sophisticated responses than lower achieving students. The exception was the finding that more lower achievers than higher achievers provided one or more reasons to explain why they would select a particular store as the place to buy a shirt (i.e., more specific reasons than "because they sell shirts/clothes there"). We suspect that the high achievers tended to assume that the latter response was not only an obvious but a sufficient answer to the question about why they would select a particular store, so that they didn't think to comment further about the quality, selection, or prices of the clothes sold there. Whatever the reason, this was the only instance in either our shelter or our clothing analyses in which lower achievers appeared to provide more complete or sophisticated responses than higher achievers.

Otherwise, if there is any surprise in the achievement level findings, it is that significant Chi-squares reflecting linear progressions were not observed more frequently. Perhaps this reflects the fact that most students had some level of personal experience with most of the topics addressed in our questions, so that they were not wholly dependent on knowledge acquired at school when they attempted to generate answers.

Gender differences were observed for only 10% of the coding categories. More boys than girls said that people's need for clothes depends on the climate; that people need clothes to protect them against cold; that work clothes protect workers against hazards; that we wear play clothes for "other" reasons; that cave dwellers wore clothes fashioned from animal skins; that processing raw material is a step in manufacturing a shirt; that liking the design or print on a shirt would be a factor in deciding which shirt to buy; that metal is used in making some shoes; and that leather is animal hide. More girls than boys said that work clothes are old or worn clothes that we don't mind getting dirty; that work clothes are uniforms; that we wear play clothes because they are washable and we can get them dirty; that threads come from "other" sources; that pioneers made some of their clothes but bought others; that one factor determining choice of a shirt would be that the shirt was intended for a girl; and that leather was made from something other than animal hide. As far as they go, these differences indicate that boys were more aware of the protective function of clothing but girls were more aware of the need for washable work and play clothes, and that boys knew more than girls about leather. A few of these differences fit patterns that reflect what is known about gender differences in socialization. However, as was the case with the gender differences that appeared on only 9% of the response categories for our shelter interview, these gender differences in responses to the clothing interview need to be considered within a larger picture indicating that they were infrequent in number and small in

magnitude. Overall, the response patterns for boys and girls were much more similar than different.

Correlations Among Coding Categories

Correlations indicating relationships among coding categories were relatively uninformative, although interesting in at least two respects. First, these correlations indicated that certain themes (e.g., clothing as protection from cold, clothing as protection from hazards, clothing as a way to look good or make a positive social impression, wanting to wear clothing that is comfortable, or wanting to wear clothing that displays certain designs or logos) ran throughout the responses of certain students. In teaching about clothing, teachers who noted such themes could use them as a basis for individualizing instruction. Second, certain response clusters reflected contrasting levels of sophistication. These clusters occurred because some students consistently gave “don’t know” or naïve responses to questions calling for knowledge (i.e., not just for opinions or preferences); other students often lacked the specific knowledge needed to give complete and accurate responses but were able to generate relatively sophisticated guesses; and still other students typically were able to produce complete and accurate responses or at least to generate sophisticated guesses (for their age group). Consequently, across different topics, “don’t know” and naïve responses tended to intercorrelate, responses that indicated good reasoning from very limited knowledge bases tended to intercorrelate, and correct responses and responses indicating good reasoning from more complete knowledge bases tended to intercorrelate.

In identifying such patterns and attributing them to subsets of students who were relatively consistent in their levels of knowledge and sophistication concerning the topics

addressed in our interview, we do not mean to suggest that all students showed such consistency. In addition to the consistent students, there was another subset of students who were quite inconsistent (e.g., saying little more than “don’t know” to questions about one topic but answering questions about other topics completely and accurately).

Limitations of the Study

Our interviewers generally established good rapport with students and our questions were tailored for the age levels involved, so we believe that our findings comprise a generally valid representation of the nature and development of K-3 students’ knowledge and thinking about clothing as a cultural universal. Some of the students might have been more responsive if they had been interviewed on an other day, and all of the students might have been able to say more if we had included more illustrations to provide visual cues (especially about clothes of the past). However, illustrations usually were not needed because we were asking the children about issues with which they had had personal experience, so verbal questions alone usually were sufficient to enable them to understand what we were asking. Also, we have found that illustrations tend to “stimulus bind” children’s responses, and we prefer them to respond using their own images of the objects, events, or processes we ask them about, not images that we might supply by showing them a photo or other illustration.

The sample was large enough to allow population differences by grade level, SES level, achievement level, or gender to be detected via statistically significant Chi-squares in our analyses. Despite its large size, however, our sample was limited in at least three respects. First, it was limited to the middle three-fourths or so of the SES range. No subsamples representing the upper-upper SES or the lower-lower SES groups were included.

Second, even though the sample was stratified by SES rather than race or ethnicity, the populations of the communities involved were such that all three SES groups were overwhelmingly European American in their ethnic composition. Few students from African-American, Asian-American, Latino, or Native American families were included. We believe that children's ideas about clothing are more likely to be influenced by their common experiences growing up with in the contemporary U.S. society and culture than by differences in their family backgrounds, so we do not believe that this sample limitation is as serious as it might have been if we were asking questions about race or ethnicity. This is an untested assumption, however, and it remains to be seen whether our findings will generalize to racial and ethnic minorities.

The third limitation in the sample was geographic. The students all lived in Michigan. It is possible that somewhat different patterns of response to at least some of our questions might have been elicited from students living in considerably warmer or colder regions that do not have the four-season climate that Michigan has.

Consideration of these sample limitations and the findings from our first two studies have led us to conclude that our future research into children's knowledge and thinking should modify our approach to addressing differences in the children's home backgrounds. The findings suggest that it is not cost effective to systematically sample across the socioeconomic status range, given that the observed SES differences in these first two studies were relatively small and not especially interesting or informative. Students from higher SES backgrounds tended to have more, or more accurate, knowledge than students from lower SES backgrounds, but the same general developmental patterns were observed in each group. We did not find theoretically or practically interesting group contrasts suggesting qualitatively different development paths or contrasting constructions of knowledge that were unique to particular SES groups.

Consequently, we have concluded that in future studies it will be more efficient to concentrate the initial research at the lower middle-class level and then address possible sample differences in follow-up studies. For example, we plan to follow up the shelter study by interviewing students who live in Manhattan, a highrise, high-density residence area that contrasts with the lowrise, low-density communities of the Michigan students whom we interviewed. Also, given that our food interview includes several questions on farming and the origins of food, we will follow up our food study by interviewing a sample of students from farm families. No such follow-up interviewing is planned for the topic of clothing because we see no basis for predicting sharply different response patterns from children who are growing up in contemporary U.S. society but come from geographical locations or family backgrounds different from those of the Michigan students we interviewed. However, we would expect that students from the sunbelt states and Hawaii would be oriented less to clothing's function of protecting people against cold and more towards its other functions than the Michigan students were.

Another limitation of the study is its lack of systematic data on the origins of students' ideas. Interviewers were instructed to ask students about where they got their information when they gave unusually sophisticated or detailed responses, but we did not routinely ask about the sources of the students' information. This was because we view the work as initial, establishing-the-parameters research in an emerging field, rather than as more specifically targeted research in a more mature field. We are trying to establish initial norms or parameters concerning five-to-eight-year-old American children's knowledge and thinking about cultural universals, not to trace the origins of the knowledge, to establish the mechanisms through which development occurs, or to address other issues that might become more relevant farther down the road. This

“outline the big picture first, then start filling in the details” approach is the way that science normally proceeds in emerging fields.

We assume that particular subsets of knowledge and thinking are developed through a mixture of mechanisms that will vary with the topic. For example, a lot of spontaneous knowledge development probably occurs in learning about aspects of cultural universals that are observable in the home and neighborhood. In contrast, most of what is learned about aspects that existed in the past or currently exist only in other areas or cultures would have to be learned primarily through transmission of knowledge (initially from family members and the media, later at school). Eventually we will learn more about the mechanisms through which knowledge is acquired, what experiences need to grow through change outside of school, how easy or difficult it may be to teach particular networks of knowledge in school, and what materials and methods may be helpful in doing so.

Implications for Primary-Grade Social Studies

In the introduction to this report we noted that Ravitch and others have claimed that primary-grade students do not need to be taught about cultural universals because they already know this information, having picked it up through everyday life experiences. This may be true for the very limited and trite information contained in many primary-grade social studies textbooks. Concerning clothing, for example, this information often is confined to the ideas that clothing is a universal need and that people around the world wear many different kinds of clothes. We have no doubt that most children do develop intuitive understandings of these ideas through informal life experiences, and further that those who have not developed the ideas on their own are likely to understand them readily when they are pointed out by a teacher.

However, the findings of this study indicate clearly that children do not routinely acquire all, or even a significant portion, of what is worth knowing about cultural universals through everyday experiences (primarily because these experiences are informal and do not include sustained discourse structured around key ideas). Furthermore, the mostly tacit knowledge that they do accumulate is limited, disconnected, and frequently distorted by naïve ideas or outright misconceptions. We conclude from this that primary-grade students do stand to benefit from instruction about cultural universals, although the kind of instruction that we envision is much more coherent and powerful than the kind that students are likely to receive from teachers who confine themselves to the content in the major publishers' elementary social studies textbook series and the questions and activities suggested in the accompanying teachers' manuals.

We believe that such instruction belongs in the primary-grades social studies curriculum, although in addition to (not instead of) efforts to develop students' prosocial values and dispositions and a variety of skills ranging from map reading to critical thinking and decision making. The questions asked in this study reflect our notions about key ideas that might be emphasized in teaching about clothing. Some of them might be classified more readily as science than social studies, but they all tap networks of knowledge that we believe to be basic for developing initial understandings of the topic. Like others who have focused on the primary grades, we believe that the curriculum in these grades should feature pandisciplinary treatments of topics designed to develop "knowledge of limited validity" (Levstik, 1986) or "protodisciplinary knowledge" (Gardner & Boix-Mansilla, 1994) about the topic, rather than attempts to teach children disciplinary knowledge organized as such.

We favor an appropriate balance between the three traditional sources of curricula (knowledge of enduring value, including but not limited to disciplinary knowledge; the students'

needs, interests, and current zones of proximal development; and the needs of society in terms of the knowledge, skills, values, and dispositions that our society would like to see developed in future generations of its citizens). Within this context, we argue that a pandisciplinary introduction to the social world (past and present taught, with emphasis on developing understanding, appreciation, and life application of big ideas) makes more sense for primary-grade students than what we view as premature attempts to socialize these students into the academic disciplines.

In conclusion, we believe that primary-grade students stand to benefit considerably from treatments of cultural universals that are more powerful than those typically offered by textbook series. We define powerful treatments as treatments that enable students to develop understanding of how the cultural universal addressed in the unit works in our society, how and why it got to be that way over time, how it varies across locations and cultures, and what all of this might mean for personal, social, and civic decision making.

These goals suggest four principles in selecting and developing content. First, using contemporary and familiar examples, the unit should help students to understand how and why the social system functions as it does with respect to the cultural universal being studied. The unit on clothing, for example, might begin with forms of clothing commonly found in the contemporary United States, especially in the students' own neighborhoods. Instruction would be designed to help students articulate the tacit knowledge that they already possess, as well as to expand on and embed it within a knowledge network structured around powerful ideas (e.g., clothing has several functions in addition to protection, cloth is a woven fabric rather than a solid, thread is spun from raw material, and leather is processed animal hide).

Second, the unit should include a historical dimension illustrating how human responses to the cultural universal have evolved through time due to inventions and other cultural advances. For example, clothing has evolved from the animal-hide body coverings of the cave dweller days through the mostly coarse, simple, and homespun garments of the past to the mass production and myriad of fabrics that characterize today's clothes. Technological advances have enabled us to produce clothes that are easier to get on and off, better fitting, more varied, and lighter yet more effective in protecting us from weather and environmental hazards.

Third, the unit should include a geographical/cultural dimension that exposes students to current variations in human responses to the cultural universal. Different forms of clothing exist in different geographical locations, in part because of differences in climate and availability of raw materials and in part because of cultural differences. Along with the historical dimension, this geographical/cultural dimension of the unit would extend students' concepts to include examples different from the ones they view as prototypical. This would help them to place themselves and their familiar social environments into perspective as parts of the larger human condition as it has evolved through time and as it varies across cultures. In the language of anthropologists, it would "make the strange familiar" and "make the familiar strange" so that students could appreciate seemingly exotic forms of clothing as intelligent adaptations to local circumstances.

Fourth, topic coverage should include emphasis on applications to students' current and future lives. This can be accomplished through activities designed to raise students' consciousness of choices that they will be making as individuals and as citizens, and of the trade-offs associated with the major choice options. For example, clothing lessons might include discussion of the trade-offs offered by different fabrics or types of clothes, ways to get the most

out of limited clothing budgets, the ways that people project personal identity and lifestyle preferences through their choice of clothing (and the ways that schools and society seek to control this), or what might be done to help people who do not have enough money to purchase adequate clothing for themselves and their families.

Units on cultural universals that incorporate these principles would be far more powerful than ostensibly similar units found in contemporary textbooks. They would help students begin to understand (be able to explain in their own words) how and why things are as they are for them personally as well as for people in very different circumstances. For example, a unit on clothing would help students to understand and respect the decisions their families have made regarding what kinds of clothing to wear, through planned interactions with parents concerning their perceptions of the family's clothing needs, lifestyle wants, financial constraints, and other factors that affected their clothing decisions. Through activities and discourse in class, students would learn about the decisions made by other families in their community and around the world, in ways that would help them to develop empathy for the individuals and appreciation for the diverse cultures that comprise the human condition. Gaining such knowledge and appreciation should help students to become more comfortable with their personal identities and circumstances, and at the same time begin to build their capacity and sense of efficacy for making decisions that will enable them to take charge of planning for their futures.

Such units would still focus on elementary and familiar content in that they would address fundamental aspects of the human condition and connect with experience-based tacit knowledge that students already possess. However, they would not merely reaffirm what students already know. Instead, they would raise students' consciousness of and help them to construct articulated knowledge about basic aspects of the cultural universal that they have only

vague and tacit knowledge about now (aspects that are concrete and comprehensible to them given their limited cognitive structures and prior knowledge; abstract topics such as fabric science or the macroeconomics of clothing would not be included). Such units also would introduce students to a great deal of new information, develop connections to help them transform scattered understandings into a network of integrated knowledge, and stimulate them to apply the knowledge to their lives outside of school and to think critically and engage in value-based decision making about the topic. For more information about such units, see Brophy & Alleman (1996).

Conclusion

This study has shown that five- to eight-year-old American children's knowledge and thinking about clothing is much less complete and accurate than Ravitch and others have assumed. Most of the students were knowledgeable about the surface features of clothing of the present (business, work, and play clothes) and the past (cave dweller, Pilgrim/pioneer, and early 20th century clothes), and most could speak knowledgeably about where to purchase clothes and what factors to take into account when doing so. However, most students lacked knowledge or harbored misconceptions about the basic nature of clothing (i.e., cloth as woven fabric) and about the land-to-hand connections involved in manufacturing clothing and shoes.

Developmental progressions in knowledge were evident across the age range studied for most aspects of the topics addressed in our interview, but even the third graders displayed only limited understanding of many issues, especially causal relationships. Interesting relationships also appeared with SES level, achievement level, and gender, although most of these amounted to only minor variations on the main themes established by the grade level progressions. The

findings extend our knowledge about development in children's domain-specific knowledge and thinking and suggest key ideas that might be developed in teaching about clothing as a cultural universal in the primary grades.

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Table 1. Descriptive Statistics for Scores Derived from Questions 1-6: Need for and Types of Clothing

Number of Students Interviewed	Total Sample	Grades			Socioeconomic Status			Achievement Level			Gender		
		K	1	2	3	Low	Avg.	High	Low	Avg.	High	M	F
<u>Response Categories</u>	213	54	54	53	52	71	72	70	71	70	72	107	106
A. Do People Need Clothes?													
0. No.	12	5	1	1	5	7	1	4	3	6	3	4	8
1. Depends on the climate	8	4	1	1	2	4	2	2	1	3	4	7	1
2. Yes (unqualified)	193	45	52	51	45	60	69	64	67	61	65	96	97
B. Why Do People Need Clothes?													
0. Doesn't know	18	7	10	0	1	9	5	4	6	6	6	10	8
1. Protect against cold	153	32	34	44	43	44	56	53	49	53	51	84	69
2. Protect against dirt, sun, insects injury	35	6	6	7	16	6	11	18	7	12	16	21	14
3. Modesty	99	21	24	25	29	38	33	28	35	28	36	45	54
4. Decoration/they look good on you	10	2	1	2	5	2	5	3	2	1	7	3	7
5. Number of B1-B4 categories coded*	1.4	1.1	1.2	1.5	1.8	1.3	1.5	1.5	1.3	1.4	1.5	1.4	1.4
C. What Are Business Clothes?													
0. Doesn't know/no relevant response	44	32	6	6	0	17	15	12	19	16	9	22	22

Table 1 (continued)

1. Formal or semi-formal clothes	159	14	44	43	48	45	53	51	44	49	56	75	74
2. Work clothes/uniforms	20	8	4	4	4	9	4	7	8	5	7	10	10
D. Why Do Business People Wear Business Clothes?													
0. Doesn't know/no relevant response	71	38	19	8	6	25	25	21	29	22	20	34	37
1. Protection/no business-specific reason	22	7	4	7	4	10	6	6	11	4	7	12	10
2. Present good appearance to public	120	9	31	38	42	36	41	43	31	44	45	61	59
E. What Are Work Clothes?													
0. Doesn't know	32	18	10	3	1	14	14	4	18	9	5	19	13
1. Old, worn clothes that you can get get dirty	170	34	42	47	47	55	55	60	48	56	66	80	90
2. Heavy, protective clothes	73	13	22	19	19	22	21	30	20	30	23	39	34
3. Uniforms	10	2	1	3	4	1	6	3	4	4	2	1	9
F. Why Do Workers Wear Work Clothes?													
0. Doesn't know/no relevant response	62	26	22	10	4	20	25	17	27	21	14	33	29
1. So people will know that you work there	11	2	3	2	4	4	4	3	2	5	4	4	7
2. Protection from dirt (keep you clean)	111	22	24	29	36	38	33	40	31	32	48	50	61

Table 1 (continued)

3. Protection from hazards (keep you safe)	43	5	11	14	13	13	15	15	13	19	11	27	16
4. Required by company/boss	8	0	2	4	2	4	3	1	1	5	2	4	4
G. What Are Play Clothes?													
1. Describes casual/play clothes (jeans t-shirts, sweatshirts, shorts, etc)	205	46	54	53	52	66	71	68	70	66	69	102	103
H. Why Do We Wear Play Clothes?													
0. Doesn't know/no relevant response	26	16	7	3	0	10	9	7	10	12	4	17	9
1. Protection/no play-specific reason	15	7	6	1	1	5	6	4	9	2	4	7	8
2. You can get them dirty/they're washable	148	27	36	44	41	52	47	49	47	50	51	65	83
3. They're comfortable, soft, easy to relax in	21	2	5	5	9	8	6	7	3	4	14	11	10
4. Other (they look nice, they're what you always wear except when dressing up)	14	2	5	2	5	3	5	6	3	5	6	10	4
I. Why Do Some Workers Wear Uniforms?													
0. Doesn't know/no relevant response	32	23	6	2	1	11	13	8	13	9	10	16	16
1. Specific examples (tool belts/pockets, police equipment, etc.)	7	1	4	1	1	3	1	3	2	0	5	5	2

Table 1 (continued)

2. So people will know that they work there	141	18	32	46	45	46	44	51	43	45	53	67	74
3. Protection against dirt or hazards	36	5	14	10	7	16	13	7	14	12	10	22	14
4. Company/boss requires it	31	5	11	6	9	11	10	10	10	13	8	14	17
5. Other	22	4	5	7	6	7	7	8	10	6	6	10	12

*Numbers in this row are means. Numbers in all other rows are frequency distributions indicating how many students in each group were coded for mentioning the ideas represented by the response category. Underlining indicates that the Chi-square for the underlined score distribution was statistically significant at or below the .05 level.

Table 2. Significant Correlations Between Categories of Students and Scores Derived from Questions 1-6

<u>Response Categories</u>	<u>Grade Level</u>	<u>Socioeconomic Status</u>	<u>Achievement Level</u>	<u>Female Gender</u>
A. Do People Need Clothes?				
0. No		NL		
1. Depends on climate				-15
2. Yes (unqualified)	NL	NL		
B. Why Do People Need Clothes?				
0. Doesn't know	-28			
1. Protect against cold	24	16		-15
2. Protect against dirt, sun insects, injury	22	19		
3. Modesty				
4. Decoration/they look good on you			17	
5. Number of B1-B4 categories coded*	37			
C. What Are Business Clothes?				
0. Doesn't know/no relevant response	-57		-15	
1. Formal or semi-formal clothes	57			
2. Work clothes/uniforms				
D. Why Do Business People Wear Business Clothes?				
0. Doesn't know/no relevant response	-50			
1. Protection/no business-specific reason				

Table 2 (continued)

2. Present good appearance to public	50		18	
E. What Are Work Clothes?				
0. Doesn't know/no relevant response	-35	-18	-22	
1. Old, worn clothes that you can get dirty	27		25	13
2. Heavy, protective clothes				
3. Uniforms				18
F. Why Do Workers Wear Work Clothes?				
0. Doesn't know/no relevant response	-36		-17	
1. So people will know that you work there				
2. Protection from dirt (keep you clean)	22		21	
3. Protection from hazards (keep you safe)	17			-13
4. Required by company/boss				
G. What Are Play Clothes?				
1. Describes casual/play clothes (jeans, t-shirts, sweatshirts, shorts, etc.)	34			
H. Why Do We Wear Play Clothes?				
0. Doesn't know/no relevant response	-34		-15	-11
1. Protection/no play-specific reason	-20		-16	
2. You can get them dirty/they're washable	28			19
3. They're comfortable, soft, easy to relax in			23	

Table 2 (continued)

- | | |
|--|------------|
| 4. Other (they look nice, they're what you always wear except when dressing up) | -11 |
|--|------------|

I. Why Do Some Workers Wear Uniforms?

- | | | |
|--|------------|-----------|
| 0. Doesn't know/no relevant response | -46 | |
| 1. Specific examples (tool belts/pockets, police equipment, etc.) | | 16 |
| 2. So people will know that they work there | 47 | |
| 3. Protection against dirt or hazards | | |
| 4. Company/boss requires it | | |
| 5. Other | | |

All numbers are phi coefficients significant at or below the .05 level (decimal points omitted). The letters "NL" indicate a statistically significant but nonlinear relationship.

Table 3. Descriptive Statistics for Scores Derived from Questions 7-9: The Manufacture of Threads and Cloth

Number of Students Interviewed	Socioeconomic Achievement										Level		Gender	
	Total					Status					Avg.		M	F
	Sample	K	1	2	3	Low	Avg.	High	Low	High	Low	High		
<u>Response Categories</u>	213	54	54	53	52	71	72	70	71	70	72	72	107	106
A. What Are Clothes Made From?														
0. Doesn't know/no relevant response	25	20	3	2	0	9	8	8	10	9	6	6	11	14
1. Cloth, material, fabric	85	7	27	25	26	29	26	30	19	27	39	39	43	42
2. Thread, string, yarn, knitting, stitching	75	19	22	17	17	28	29	18	32	18	25	25	36	39
3. Wool, fur, animal skin, leather	88	11	25	28	24	19	27	42	32	26	30	30	46	42
4. Silk, cotton, linen, polyester, denim	69	6	18	17	28	22	26	21	15	25	29	29	34	35
5. Other	9	4	3	1	1	4	1	1	7	0	2	2	6	3
B. What is Cloth Made From?														
0. Doesn't know/no relevant response	52	24	15	8	5	15	18	19	22	21	9	9	24	28
1. Woven or knitted from thread, yarn, etc.	57	6	14	17	20	17	15	25	14	15	28	28	28	29

Table 3 (continued)

2. Pieces of cloth are sewn together (no knowledge that cloth is woven)	23	2	7	7	7	9	7	7	6	7	10	8	15
3. Raw materials are processed directly (e.g., fluffy cotton is ironed or flattened by machines)	27	2	8	9	8	11	8	8	5	12	10	15	12
4. Made by recycling old clothes, socks, etc.	7	2	1	2	2	3	2	2	3	2	2	3	4
5. Animal or plant sources (fur, wool, feathers, cotton, silk, etc.) (no knowledge of weaving)	36	8	9	10	9	10	17	9	14	6	16	18	18
6. Other (wood, straw, paper, gel, spider webs, etc.)	17	9	3	4	1	7	7	3	9	4	4	7	10
7. Says that cloth is made from thread, yarn, etc., but can't explain how	24	5	8	5	6	10	8	6	10	7	7	13	11
C. Where Do Threads Come From?													
0. Doesn't know/no relevant response	79	23	19	20	17	31	32	16	26	22	31	38	41
1. Spun from raw material	27	1	6	11	9	4	7	16	5	10	12	15	12
2. Stores, factories, machines	39	14	10	2	13	14	9	16	16	10	13	21	18
3. Cut/unravel cloth	18	3	4	8	3	5	5	8	4	7	7	8	10

Table 3 (continued)

4. Found materials (hair, animal skin, string, whatever silkworms produce, etc.)	44	10	17	7	10	17	14	13	19	18	7	25	19
5. Other (feathers, paper, silk, wool, weaving, etc.)	15	6	2	6	1	3	9	3	5	3	7	4	<u>11</u>

Numbers are frequency distributions indicating how many students in each group were coded for mentioning the ideas represented by the response category. Underlining indicates that the Chi-square for the underlined score distribution was statistically significant at or below the .05 level.

**Table 4. Significant Correlations Between Categories of Students
and Scores Derived from Questions 7-9**

<u>Response Categories</u>	<u>Grade Level</u>	<u>Socioeconomic Status</u>	<u>Achievement Level</u>	<u>Female Gender</u>
A. What Are Clothes Made From?				
0. Doesn't know/no relevant response	-46			
1. Cloth, material, fabric	32		23	
2. Thread, string, yarn, knitting, stitching			NL	
3. Wool, fur, animal skin, leather	25	28		
4. Silk, cotton, linen, polyester, denim	32		18	
5. Other			-21	
B. What is Cloth Made From?				
0. Doesn't know/no relevant response	-31		-20	
1. Woven or knitted from thread, yarn, etc.	23	14	20	
2. Pieces of cloth are sewn together (no knowledge that cloth is woven)				
3. Raw materials are processed directly (e.g., fluffy cotton is ironed or flattened by machines)				
4. Made by recycling old clothes, socks, etc.				
5. Animal or plant sources (fur, wool, feathers, cotton, silk, etc.) (no knowledge of weaving)			NL	
6. Other (wood, straw, paper, gel, spider webs, etc.)	-20			
7. Says that cloth is made from thread, yarn, etc., but can't explain how				

Table 4 (continued)

C. Where Do Threads Come From?

0. Doesn't know/no relevant response		-21	
1. Spun from raw material	22	22	
2. Stores, factories, machines	NL		
3. Cut/unravel cloth			
4. Found materials (hair, animal skin, string, whatever silkworms produce, etc.		-19	
5. Other (feathers, paper, silk, wool, weaving, etc.)		NL	13

All numbers are phi coefficients significant at or below the .05 level (decimal points omitted). The letters "NL" indicate a statistically significant but nonlinear relationship.

Table 5. Descriptive Statistics for Scores Derived from Questions 10-13 and 17: Evolution in Clothing Over Time

Number of Students Interviewed		Total Sample	Grades			Socioeconomic Status			Achievement Level			Gender		
			K	1 2 3		Low	Avg. High		Low	Avg. High		M	F	
				1	2		3	Avg.		High	Avg.			High
Response Categories		213	54	54	53	52	71	72	70	71	70	72	107	106
A. What Did Cave Dwellers Wear?														
0. Doesn't know/no relevant response		37	26	5	5	1	11	13	13	15	13	9	15	22
1. Clothes fashioned from animal skins (not woven)		130	15	31	39	45	41	46	43	34	47	49	74	56
2. Other (wool, woven cloth, made from leaves or branches, Pilgrim clothes, etc.)		45	13	18	8	6	18	13	14	21	10	14	18	27
B. What Did the Pilgrims Wear?														
0. Doesn't know/no relevant response		49	31	11	6	1	13	20	16	21	17	11	27	22
1. Conventional description of Pilgrim clothes		66	4	18	23	21	23	20	23	12	25	29	33	33
2. Conventional description of pioneer clothes		54	3	9	18	24	16	11	27	17	16	21	30	24

Table 5 (continued)

3. Other, partly correct (wool clothes, Indian clothes, ruffled shirts and coats, etc.)													
41	12	15	8	6	16	18	7	18	9	14	17	24	
4. Other, incorrect (animal skins, clothes just like ours, suits, uniforms, etc.)													
16	6	2	4	4	8	4	4	7	6	3	8	8	
5. Described both Pilgrim and pioneer clothes													
12	2	1	5	4	4	1	7	3	3	6	7	5	
C. How Did the Pioneers Get Their Clothes?													
0. Doesn't know/no relevant response													
90	34	28	15	13	27	32	31	35	27	28	45	45	
1. Made all or most clothes themselves													
74	7	18	20	29	25	30	19	22	25	27	40	34	
2. Bought from stores or clothing merchants													
35	13	6	11	5	13	10	12	12	11	12	18	17	
3. Made some, bought some													
14	0	2	7	5	6	0	8	2	7	5	4	10	
D. Describe Clothes When Great-Grandparents Were Children													
0. Doesn't know/no relevant response													
71	35	21	10	5	23	28	20	31	27	13	38	33	

Table 5 (continued)

1. Generally correct response (woven but heavier, less comfortable, less colorful, etc.)	98	10	22	30	36	27	28	43	23	31	44	45	53
2. Too far back in time (describes cave dweller, Middle Ages, Pilgrim, or pioneer clothes)	14	1	3	4	6	8	5	1	4	4	6	8	6
3. No difference (just like today's clothes)	21	7	7	4	3	10	7	4	7	7	7	12	9
4. Other incorrect responses (fancy clothes, no clothes, uniforms, etc.)	9	1	1	5	2	3	4	2	6	1	2	4	5
E. How Are Today's Clothes Improved?													
0. Doesn't know/no relevant response	93	44	29	16	4	35	36	22	37	32	24	45	48
1. Aesthetics (more colorful, decorated with pictures, beads, designs, etc.)	67	8	16	19	24	20	18	29	16	22	29	37	30
2. Warmer, better at keeping us warm	15	0	0	7	8	4	6	5	4	6	5	10	5
3. More comfortable (better fits, shorts and informal clothes)	31	2	8	10	11	10	9	12	10	8	13	12	19
4. Lighter/softer due to finer threads, etc.	20	2	5	4	9	6	9	5	7	6	7	11	9
5. Mass produced/good quality and variety	31	0	3	5	23	8	11	12	9	11	11	14	17

Table 5 (continued)

6. Durable (less likely to fall apart, sewn better from better materials)	14	0	2	8	4	3	4	7	3	4	7	7	7
F. What Inventions Have Made Clothes Better?													
0. Doesn't know/no relevant response	158	49	42	41	26	55	55	48	58	51	49	75	83
1. Sewing machines	40	4	6	11	19	14	12	14	9	13	18	24	16
2. Other (spinning machines, looms, ironing or pressing machines, washers or dryers, better needles, sheep-shearing equipment)	26	2	8	4	12	6	9	11	5	10	11	15	11
G. Are Clothes Easier or Harder to Take Care of Today?													
0. Doesn't know/no relevant response	14	7	1	2	4	5	5	4	4	5	5	5	9
1. Harder	58	16	16	13	13	26	18	14	21	18	19	30	28
2. Easier	143	31	38	38	36	40	49	54	47	48	48	72	71
H. Why Are Clothes Harder to Take Care of Today?													
1. Doesn't know/no relevant response	15	8	4	2	1	7	5	3	10	1	4	6	9

Table 5 (continued)

2. We have more clothes today, so it is harder to keep track of them and take care of them	12	0	4	2	6	7	2	3	5	4	3	7	5
3. Machine washing and drying is harder or takes longer than hand washing and drying	9	1	1	4	3	1	4	4	2	4	3	3	6
4. Today's (business) clothes are harder to keep clean than the clothes of the past	8	3	1	3	1	5	2	1	0	5	3	4	4
5. Other	15	4	5	2	4	6	5	4	4	4	7	10	5
6. Student is coded in H2, H3, and/or H4	27	4	6	9	8	12	8	7	7	12	8	13	14
I. Why Are Clothes Easier to Take Care of Today?													
0. Doesn't know/no relevant response	28	15	6	4	3	11	12	5	13	7	8	15	13
1. Correct statement that is not germane to the question (today's clothes are easier to put on and take off, etc.)	19	6	4	4	5	3	6	10	5	7	7	8	11
2. Machines (today we have washers, dryers, etc.)	51	4	14	17	16	12	16	23	13	20	18	29	22

Table 5 (continued)

3. Fabrics (ours are lighter and more foldable, wash and wear without ironing, etc.)	13	1	5	3	4	4	6	3	3	2	8	7	6
4. Storage (we have hampers, closets, hangers, etc.)	30	4	11	9	6	9	10	11	10	12	8	16	14
5. Other (our environment is cleaner so clothes don't get as dirty, you can buy new clothing instead of mending, etc.)	27	4	5	7	11	7	9	11	10	9	8	10	17
6. Gives at least one valid reason	92	8	27	29	28	26	31	35	25	34	33	50	42

Numbers are frequency distributions indicating how many students in each group were coded for mentioning the ideas represented by the response category. Underlining indicates that the Chi-square for the underlined score distribution was statistically significant at or below the .05 level.

**Table 6. Significant Correlations Between Categories of Students
and Scores Derived from Questions 10-13 and 17**

<u>Response Categories</u>	<u>Grade Level</u>	<u>Socioeconomic Status</u>	<u>Achievement Level</u>	<u>Female Gender</u>
A. What Did Cave Dwellers Wear?				
0. Doesn't know/no relevant response	-48			
1. Clothes fashioned from animal skins (not woven)	45		19	-17
2. Other	-21		-16	
B. What Did the Pilgrims Wear?				
0. Doesn't know/no relevant response	-50			
1. Conventional description of Pilgrim clothes	31		22	
2. Conventional description of pioneer clothes	36	22		
3. Other, partly correct (wool clothes, Indian clothes, ruffled shifts and coats, etc.)		-17		
4. Other, incorrect (animal skins, clothes just like ours, suits, uniforms, etc.)				
5. Described both Pilgrim and pioneer clothes		NL		
C. How Did the Pioneers Get Their Clothes?				
0. Doesn't know/no relevant response	-32			
1. Made all of most clothes themselves	32			
2. Bought from stores or clothing merchants				
3. Made some, bought some	21	NL		12

Table 6 (continued)

D. Describe Clothes When Great-Grandparents Were Children

0. Doesn't know/no relevant response	-45		-24
1. Generally correct response (woven but heavier, less comfortable, less colorful, etc.)	38	22	24
2. Too far back in time (describes cave dweller, Middle Ages, Pilgrim, or pioneer clothes)		-16	
3. No difference (just like today's clothes)			
4. Other incorrect responses (fancy clothes, no clothes, uniforms, etc.)			-15

E. How Are Today's Clothes Improved?

0. Doesn't know/no relevant response	-55	-17	-16
1. Aesthetics (more colorful, decorated with pictures, beads, designs, etc.)	24	15	16
2. Warmer, better at keeping us warm	28		
3. More comfortable (better fits, shorts and informal clothes)	19		
4. Lighter/softer due to finer threads, etc.	17		
5. Mass produced/good quality and variety	49		
6. Durable (less likely to fall apart, sewn better from better materials)	23		

F. What Inventions Have Made Clothes Better?

0. Doesn't know/no relevant response	-34
1. Sewing machines	29
2. Other (spinning machines, looms, ironing or pressing machines, washers or dryers, better needles, sheep-shearing equipment)	23

Table 6 (continued)

G. Are Clothes Easier or Harder to Take Care of Today?

- | | |
|--------------------------------------|-----|
| 0. Doesn't know/no relevant response | |
| 1. Harder | -16 |
| 2. Easier | 18 |

H. Why Are Clothes Harder to Take Care of Today?

- | | | |
|--|-----|-----|
| 1 Doesn't know/no relevant response | -20 | -16 |
| 2. We have more clothes today, so it is harder to keep track of them and take care of them | | |
| 3. Machine washing and drying is harder or takes longer than hand washing and drying | | |
| 4. Today's (business) clothes are harder to keep clean than the clothes of the past | | |
| 5. Other | | |
| 6. Student is coded in H2, H3, and/or H4 | | |

I. Why Are Clothes Easier to Take Care of Today?

- | | | |
|--|-----|----|
| 0. Doesn't know/no relevant response | -27 | |
| 1. Correct statement that is not germane to the question (today's clothes are easier to put on and take off, etc.) | | 14 |
| 2. Machines (today we have washers, dryers, etc.) | 23 | 16 |
| 3. Fabrics (ours are lighter and more foldable, wash and wear without ironing, etc.) | | 15 |
| 4. Storage (we have hampers, closets hangers, etc.) | | |

Table 6 (continued)

- | | |
|---|----|
| 5. Other (our environment is cleaner so clothes don't get as dirty, you can buy new clothing instead of mending, etc. | |
| 6. Gives at least one valid reason | 34 |

All numbers are phi coefficients significant at or below the .05 level (decimal points omitted). The letters "NL" indicate a statistically significant but nonlinear relationship.

Table 7. Descriptive Statistics for Scores Derived from Questions 14-16 and 18-20: Modern Clothes and Shoes

Number of Students Interviewed	Total Sample	Grades			Socioeconomic Status			Achievement Level			Gender		
		K	1	2	3	Low	Avg.	High	Low	Avg.	High	M	F
Response Categories	213	54	54	53	52	71	72	70	71	70	72	107	106
A. Steps in Manufacture of Student's Shirt or Dress													
0. Doesn't know/no relevant response	22	16	3	3	0	6	12	4	11	7	4	12	10
1. Process raw material (shear sheep, pick and clean cotton, etc.)	19	4	3	6	6	3	5	11	4	5	10	15	4
2. Dye to add color	34	9	9	11	5	10	9	15	10	11	13	15	19
3. Spin thread or yarn from raw material	10	0	1	5	4	3	1	6	1	1	8	7	3
4. Weave cloth from thread or yarn	63	7	21	17	18	24	16	23	23	17	23	34	29
5. Cut cloth into shaped pieces of garment	24	4	7	8	5	8	6	10	7	9	8	11	13
6. Sew, stitch, or knit pieces together to form garment	99	25	22	36	16	35	27	37	33	32	34	49	50
7. Add trim, ruffles, belt loops, buttons, pockets, collar, etc.	31	3	13	7	8	10	6	15	5	12	14	18	13
8. Add decorative design, logo, etc.	47	3	17	17	10	19	10	18	10	19	18	21	26

Table 7 (continued)

9. Black box responses that combine Steps 4-6 (e.g., make it into a shirt)													
58	7	11	7	33	17	22	19	15	17	26	30	28	
10. Number of steps mentioned (0=0, 1=1, 2=2, 3=3 or more)*													
1.7	1.1	1.8	2.0	2.0	1.8	1.4	2.0	1.5	1.7	2.0	1.8	1.7	
B. Where Student Thinks Shirt or Dress Was Made													
0. Doesn't know/no relevant response													
64	23	18	10	13	19	29	16	26	21	17	32	32	
1. Handmade by individual													
7	0	2	4	1	2	2	3	3	3	1	3	4	
2. Machine-made at a factory													
107	14	23	34	36	39	32	36	25	35	47	56	51	
3. Machine-made at the store where it was purchased													
35	17	11	5	2	11	9	15	17	11	7	16	19	
C. Student's Explanation for Where Shirt or Dress Was Made													
0. Doesn't know/no relevant response													
69	27	21	15	6	24	31	14	25	21	23	34	35	
1. It was made somewhere near where it was purchased													
63	20	19	15	9	21	18	24	23	21	19	30	33	
2. It was made in a factory located where raw materials are plentiful													
58	6	11	16	25	15	16	27	16	21	21	32	26	
3. It could have been made almost anywhere, clothes are made in many places													
23	1	3	7	12	11	7	5	7	7	9	11	12	

Table 7 (continued)

D. Why People in Other Parts of the World Dress Differently Than We Do

1. Doesn't know if people dress differently, or thinks that everyone dresses the same everywhere	12	6	5	1	0	5	6	1	8	3	1	5	7
2. Says that there are places where people dress differently, but cannot give examples or explanations	70	29	19	15	7	19	29	22	25	25	20	36	34
3. Identifies types of people who dress differently (poor or homeless, boys vs. girls, Pilgrims, etc.)	49	10	13	11	15	19	18	12	18	14	17	24	25
4. Identifies styles of clothing (bathing suits, smocks, strips of cloth wrapped around you, etc.)	15	2	4	6	3	7	4	4	5	5	5	10	5
5. Climate explanations (fewer/lighter clothes in hot climates, more/heavier clothes in cold climates)	40	1	8	12	19	11	3	16	7	13	20	20	20
6. Economic development explanations (third world lacks access to variety of clothes, some people make clothes from leaves or found materials)	12	1	7	2	2	4	2	6	3	5	4	6	6
7. Culture/custom examples (sombrosos or blankets in Mexico, Chinese robes, Indian saris, etc.)	50	5	6	13	26	19	11	20	12	16	22	24	26

Table 7 (continued)

8. Gives at least two substantive responses (coded as G3, G5, G6, or G7)	28	0	6	3	19	10	8	10	5	10	13	14	14
E. Reasons for Choice of Store in Which to Purchase Shirt													
0. Doesn't know/no relevant response	4	3	1	0	0	2	1	1	3	1	0	3	1
1. A store that sells clothes (no elaboration)	81	30	21	16	14	27	34	20	19	29	33	40	41
2. Store offers good quality clothes	64	12	11	20	21	17	21	26	22	21	21	27	37
3. Store offers large selection	62	8	21	17	16	21	16	25	23	18	21	33	29
4. Store offers reasonable prices, good sales	21	2	3	6	10	8	5	8	8	8	5	13	8
5. Student gives two or more reasons (among quality, selection, or price)	18	1	3	6	8	4	5	9	4	6	8	8	10
F. Reasons for Choice of Shirt to Purchase													
0. Doesn't know/no relevant response	27	16	8	3	0	10	8	9	9	11	7	17	10
1. Appearance (shirt is nice, pretty, attractive, etc.)	69	13	20	17	19	22	24	23	17	25	27	35	34
2. Shirt "looks good on me" when tried on	17	1	1	6	9	7	6	4	4	6	7	6	11
3. Price (reasonable)	34	5	11	9	9	10	8	16	10	8	16	15	19

Table 7 (continued)

4. Color (favorite color, likes the color)	53	7	15	16	15	16	20	17	21	15	17	22	31
5. Design/print (it has an animal on it, etc.)	51	15	13	11	12	15	21	15	23	14	14	31	<u>20</u>
6. Fabric (likes silk, flannel, a jersey, etc.)	20	4	3	6	7	7	5	8	5	10	5	10	10
7. Size/fit (just right)	58	<u>5</u>	<u>10</u>	<u>18</u>	<u>25</u>	17	18	23	16	21	21	24	34
8. Season (light shirt for warm weather, etc.)	12	1	4	2	5	1	7	4	2	2	8	7	5
9. Other (clean, same as shirt being replaced, etc.)	15	2	4	5	4	7	3	5	7	5	3	6	9
10. Gender (wants a shirt made for a boy/girl)	6	1	1	1	3	2	2	2	3	3	0	1	<u>5</u>
11. Matches wardrobe (goes with other clothes)	8	0	1	4	3	3	2	3	3	3	2	2	6
12. Quality (well made, will last, won't shrink)	9	0	3	2	4	1	3	5	1	3	5	6	3
13. Style/fashion (matches student's taste, "in" now, etc.)	7	<u>0</u>	<u>1</u>	<u>1</u>	<u>5</u>	2	3	2	1	1	5	5	2
14. Number of reasons given (0=0, 1=1, 2=2, 3=3 or more)*	2.4	<u>1.1</u>	<u>2.2</u>	<u>2.5</u>	<u>3.8</u>	2.1	2.4	2.7	2.1	2.3	2.8	2.3	2.5

Table 7 (continued)

G. What Are Shoes Made Of?

0. Doesn't know/no relevant response	21	<u>13</u>	<u>4</u>	<u>4</u>	<u>0</u>	5	9	7	7	6	8	10	11
1. Leather, suede, snake skin, alligator skin, etc.	119	<u>12</u>	<u>30</u>	<u>32</u>	<u>45</u>	36	37	46	34	43	42	59	60
2. Wood	29	8	8	8	5	12	9	8	13	8	8	13	16
3. Rubber	62	9	14	16	<u>23</u>	19	21	22	22	20	20	32	30
4. Plastic (elastic), styrofoam, polyester	43	<u>5</u>	<u>11</u>	<u>14</u>	<u>13</u>	14	11	18	17	12	14	18	25
5. Fabric (material, cloth, soft stuff, wool sewing, etc.)	97	18	26	27	26	31	32	34	29	30	38	46	51
6. String, laces	37	<u>4</u>	<u>9</u>	<u>11</u>	<u>13</u>	15	13	9	14	15	8	20	17
7. Metal	28	3	8	6	11	7	9	12	11	11	6	<u>19</u>	<u>9</u>
8. Other valid responses (velcro, hard material for sole, etc.)	21	6	4	6	5	6	10	5	8	6	7	11	10
9. Incorrect responses (paper, feathers, etc.)	10	<u>4</u>	<u>5</u>	<u>0</u>	<u>1</u>	3	5	2	4	3	3	6	4
10. Number of shoe materials mentioned in Categories G1-G8 (0=0, 1=1, 2=2, 3=3, 4=4 or more)	2.0	<u>1.2</u>	<u>2.0</u>	<u>2.2</u>	<u>2.7</u>	2.0	1.9	2.1	2.0	2.0	2.0	2.0	2.0

Table 7 (continued)

H. Does the Student Know That Leather Is Animal Hide?

0. Not applicable (student never mentioned leather or was not asked what it is)	110	46	29	24	11	37	40	33	45	32	33	56	54
1. Doesn't know	35	5	10	8	12	14	11	10	11	11	13	15	20
2. Incorrect (says it's made from rubber, wood, etc.)	19	0	5	9	5	5	9	5	6	8	5	6	13
3. Correct (says it's animal skin, cowhide, deer skin, etc.)	49	3	10	12	24	15	12	22	9	19	21	30	19

I. Steps in Manufacturing Shoes

0. Doesn't know/no relevant response	32	20	7	3	2	10	15	7	14	9	9	19	13
1. Process raw materials (tan hides, clean or soften leather, process rubber or plastic to right degree of hardness, etc.)	12	1	1	6	4	3	4	5	3	4	5	6	6
2. Measure/cut/fashion the parts	103	15	19	34	35	34	33	36	26	37	40	54	49
3. Sew/glue/nail the parts together to form shoe	160	25	43	43	49	54	47	59	51	56	53	79	81

Table 7 (continued)

4. Add extras (laces, bows, buckles, polish, designs, labels, etc.)	125	25	35	33	32	45	37	43	34	44	47	62	63
5. Student mentions both making the parts (I2) and combining them (I3)	92	12	19	27	34	31	27	34	23	35	34	47	45

*Numbers in these rows are means. Numbers in all other rows are frequency distributions indicating how many students in each group were coded for mentioning the ideas represented by the response category. Underlining indicates that the Chi-square for the underlined score distribution was statistically significant at or below the .05 level.

**Table 8. Significant Correlations Between Categories of Students
and Scores Derived from Question 14-16 and 18-20**

<u>Response Categories</u>	<u>Grade Level</u>	<u>Socioeconomic Status</u>	<u>Achievement Level</u>	<u>Female Gender</u>
A. Steps in Manufacture of Student's Shirt or Dress				
0. Doesn't know/no relevant response	-38	NL		
1. Process raw material (shear sheep, pick and clean cotton, etc.)		17		-18
2. Dye to add color				
3. Spin thread or yarn from raw material	19		22	
4. Weave cloth from thread or yarn	22			
5. Cut cloth into shaped pieces of garment				
6. Sew, stitch, or knit pieces together to form garment	NL			
7. Add trim, ruffles, belt loops, buttons, pockets, collar, etc.	19	NL	15	
8. Add decorative design, logo, etc.	NL			
9. Black box responses that combine Steps 4-6 (e.g., make it into a shirt)	47		15	
10. Number of steps mentioned (0=0, 1=1, 2=2, 3=3 or more)	38	NL	21	
B. Where Student Thinks Shirt or Dress Was Made				
0. Doesn't know/no relevant response	-20	NL		
1. Handmade by individual				
2. Machine-made at factory	35		25	
3. Machine-made at the store where it was purchased	-29		-16	

Table 8 (continued)

C. Students' Explanation for Where Shirt or Dress Was Made

0. Doesn't know/no relevant response	-30	-20
1. It was made somewhere near where it was purchased	-17	
2. It was made in a factory located where raw materials are plentiful	31	18
3. It could have been made almost anywhere, clothes are made in many places	26	

D. Why People in Other Parts of the World Dress Differently Than We Do

1. Doesn't know if people dress differently, or thinks that everyone dresses the same everywhere	-20	-18
2. Says that there are places where people dress differently, but cannot give examples or explanations	-31	
3. Identifies types of people who dress differently (poor or homeless, boys vs. girls, Pilgrims, etc.)		
4. Identifies styles of clothing (bathing suits, smocks, strips of cloth wrapped around you, etc.)		
5. Climate explanations (fewer/lighter clothes in hot climates, more/heavier clothes in cold climates)	32	19
6. Economic development explanations (third world lacks access to variety of clothes, some people make clothes from leaves or found materials)	NL	
7. Culture/custom examples (sombreros or blankets in Mexico, Chinese robes, Indian saris, etc.)	38	
8. Gives at least two substantive responses (coded as G3, G5, G6, or G7)	41	

Table 8 (continued)

E. Reasons for Choice of Store in Which to Purchase Shirt

0. Doesn't know/no relevant response			
1. A store that sells clothes (no elaboration)	-23	NL	17
2. Store offers good quality clothes	20		
3. Store offers large selection	20		
4. Store offers reasonable prices, good sales	20		
5. Student gives two or more reasons (among quality, selection, or price)	19		

F. Reasons for Choice of Shirt to Purchase

0. Doesn't know/no relevant response	-34		
1. Appearance (shirt is nice, pretty, attractive, etc.)			
2. Shirt "looks good on me" when tried on	24		
3. Price (reasonable)			
4. Color (favorite color, likes the color)			
5. Design/print (it has an animal on it, etc.)			-12
6. Fabric (likes silk, flannel, a jersey, etc.)			
7. Size/fit (just right)	33		
8. Season (light shirt for warm weather, etc.)		NL	17
9. Other (clean, same as shirt being replaced, etc.)			
10. Gender (wants a shirt made for a boy/girl)			11

Table 8 (continued)

11. Matches wardrobe (goes with other clothes)

12. Quality (well made, will last, won't shrink)

13. Style/fashion (matches student's taste, "in" now, etc.)

21

15

14. Number of reasons given (0=0, 1=1, 2=2, 3=3 or more)

17

G. What Are Shoes Made Of?

0. Doesn't know/no relevant response

-30

1. Leather, suede, snake skin, alligator skin, etc.)

46

2. Wood

3. Rubber

22

4. Plastic (elastic), styrofoam, polyester

17

5. Fabric (material, cloth, soft stuff, wool, sewing, etc.)

6. String, laces

17

7. Metal

-14

8. Other valid responses (velcro, hard material for sole, etc.)

9. Incorrect responses (paper, feathers, etc.)

-18

10. Number of shoe materials mentioned in Categories G1-G8 (0=0, 1=1, 2=2, 3=3, 4=4 or more)

44

H. Does the Student Know That Leather Is Animal Hide?

0. Not applicable (student never mentioned leather or was not asked what it is)

-46

-17

Table 8 (continued)

1. Doesn't know				
2. Incorrect (says its made from rubber, wood, etc.)	NL			12
3. Correct (says it's animal skin, cowhide, deer skin, etc.)	35	15	18	-12
I. Steps in Manufacturing Shoes				
0. Doesn't know/no relevant response	-37			
1. Process raw materials (tan hides, clean or soften leather, process rubber or plastic to right degree of hardness, etc.)	18			
2. Measure/cut/fashion the parts	35		17	
3. Sew/glue/nail the parts together to form shoe	41	NL		
4. Add extras (laces, bows, buckles, polish, designs, labels, etc.)			16	
5. Student mentions both making the parts (I2) and combining them (I3)	33		16	

All numbers are phi coefficients significant at or below the .05 level (decimal points omitted). The letters "NL" indicate a statistically significant but nonlinear relationship.

Appendix A. Interview Questions

1. ALL OVER THE WORLD, PEOPLE WEAR CLOTHES. DO THEY WEAR CLOTHES BECAUSE THEY NEED TO, OR JUST BECAUSE THEY WANT TO? . . . WHY? . . . ARE THERE ANY OTHER REASONS WHY PEOPLE WEAR CLOTHES? (Continue probing until child cannot think of any more reasons.)
2. (If child's response to Question #1 only mentions keeping warm) DO THEY WEAR CLOTHES IN WARM PLACES LIKE HAWAII? . . . WHY?
3. BANKERS AND LAWYERS AND CERTAIN OTHER BUSINESS PEOPLE WEAR BUSINESS CLOTHES. CAN YOU DESCRIBE THESE BUSINESS CLOTHES THAT BANKERS OR LAWYERS WEAR? . . . WHY DO THEY WEAR THESE CLOTHES?
4. PEOPLE WHO WORK ON FARMS OR IN FACTORIES WEAR WORK CLOTHES. CAN YOU DESCRIBE THESE WORK CLOTHES? . . . WHY DO WORKERS WEAR WORK CLOTHES?
5. WHEN WE ARE JUST RELAXING AT HOME, WE WEAR CASUAL CLOTHES, OR PLAY CLOTHES. CAN YOU DESCRIBE THESE PLAY CLOTHES? . . . WHY DO WE WEAR PLAY CLOTHES WHEN WE WANT TO RELAX OR PLAY?
6. SOME WORKERS WEAR UNIFORMS, LIKE THE POLICE OR THE PEOPLE WHO WORK AT McDONALD'S. WHY DO SOME WORKERS WEAR UNIFORMS? . . . ARE THERE ANY OTHER REASONS WHY PEOPLE MIGHT WEAR UNIFORMS?
7. WHAT ARE OUR CLOTHES MADE FROM? . . . (If necessary, rub your own shirt/blouse and pants/skirt and ask:) WHAT DO WE CALL THIS MATERIAL THAT CLOTHES ARE MADE OUT OF? (Accept specific responses such as "silk" or "corduroy," but probe for "cloth" or "fabric").
8. (If child has not said so already, say OUR CLOTHES ARE MADE OUT OF CLOTH). WHAT IS CLOTH MADE FROM? . . . HOW IS ____ MADE INTO CLOTH? (Repeat these questions for as many types of cloth that the child can identify. In particular, we want to know if the child knows that cloth is woven from threads.)
9. MOST CLOTH IS MADE BY WEAVING IT FROM THREADS. (Show spool of thread) WHERE DO THREADS COME FROM? (If necessary, probe by asking HOW IS THREAD MADE FROM ____?) Repeat this question for as many sources of thread as the child is able to identify (e.g., sheep/wool, cotton).
10. LET'S TALK ABOUT CLOTHING IN THE PAST. WAY BACK WHEN PEOPLE LIVED IN CAVES--WHAT KIND OF CLOTHES DID THEY WEAR? . . . WHAT WERE THESE CLOTHES MADE OF? . . . HOW DID THEY MAKE THE ____ INTO CLOTHES?
11. BACK IN THE DAYS OF THE PILGRIMS AND THE PIONEERS, WHAT KIND OF CLOTHES DID PEOPLE WEAR? . . . WHAT WERE THESE CLOTHES MADE OF? . . . WHERE DID THE PIONEERS GET THEIR CLOTHES?

12. BACK WHEN YOUR GREAT-GRANDPARENTS WERE CHILDREN, WHAT WERE PEOPLE'S CLOTHES LIKE? . . . HOW WERE CLOTHES BACK THEN DIFFERENT FROM TODAY'S CLOTHES?

13. HOW HAVE TODAY'S CLOTHES BEEN IMPROVED OVER CLOTHES IN THE PAST? . . . DO YOU KNOW ABOUT ANY INVENTIONS THAT HAVE MADE CLOTHES BETTER THAN THEY USED TO BE?

14. HOW DO YOU THINK YOUR SHIRT (DRESS) WAS MADE? . . . WHAT WAS THE FIRST STEP IN MAKING IT? . . . THEN WHAT? . . . (Probe for specifics of process , not just statements about what it was made from).

15. WHERE DO YOU THINK YOUR SHIRT (DRESS) WAS MADE? (If child says "in a factory," ask WHERE DO YOU THINK THE FACTORY IS?) (For the last two questions, if the child is wearing homemade clothing, point to your shirt or dress, note that it was purchased at a store, and ask the same questions.)

16. ARE THERE PEOPLE IN OTHER PARTS OF THE WORLD WHO DRESS DIFFERENTLY THAN WE DO? . . . TELL ME ABOUT THAT. (Repeat for as many examples as the child can generate, and for each example ask WHY DO THEY DRESS LIKE THAT?)

17. ARE CLOTHES TODAY EASIER OR HARDER TO TAKE CARE OF THAN THEY USED TO BE? . . . WHY?

18. LET'S TALK ABOUT SHOPPING FOR CLOTHES. IF YOU WERE GOING TO BUY A SHIRT, WHERE WOULD YOU GO TO BUY IT? . . . WHY? . . . HOW WOULD YOU DECIDE WHAT SHIRT TO BUY? . . . WOULD YOU THINK ABOUT ANYTHING BESIDES _____ WHEN DECIDING WHAT SHIRT TO BUY?

19. ALONG WITH OUR CLOTHES, WE WEAR SHOES. WHAT ARE OUR SHOES MADE FROM? (If child says "leather," ask WHAT IS LEATHER?) . . . ARE THERE OTHER SHOES THAT ARE MADE OUT OF DIFFERENT MATERIALS?

20. (Show picture of shoe.) HOW DO YOU THINK THIS SHOE WAS MADE? WHAT WAS THE FIRST STEP? . . . THEN WHAT?

21. SUPPOSE THAT NEXT WEEK YOUR TEACHER WAS GOING TO TEACH YOU ABOUT CLOTHES--CLOTHES THAT PEOPLE WEAR HERE AND IN OTHER PARTS OF THE WORLD, AND WHAT CLOTHES WERE LIKE IN THE PAST. IF YOU WERE GOING TO LEARN ABOUT CLOTHES, WHAT WOULD YOU LIKE TO LEARN?

Appendix B. Coding System

Developmental Studies: Coding of Responses to the Clothing Interview

The first two questions focused on clothing as a universal human need:

1. All over the world, people wear clothes. Do they wear clothes because they need to, or just because they want to? . . . Why? . . . Are there any other reasons why people wear clothes?

2. Do they wear clothes in warm places like Hawaii? . . . Why?

These two questions are coded together because the second is simply an extension of the first, included as a way to see if students understand that people need clothes for reasons other than protection from cold. This question was omitted if it was clear from the response to Question 1 that the student had this understanding.

Relevant responses to these questions usually fall into either or both of two major categories: (1) clothing provides protection from the cold or from environmental hazards such as sunburn, insects, or dirt; and (2) clothing supports modesty by covering body parts that the person or the culture wants kept covered.

Considering responses to the first two questions taken together, code the students' ideas as follows.

Column 1: Use one of the following categories to describe the students' idea about the need for clothes:

- 0. no (people don't need clothes)
- 1. don't know/no relevant response
- 2. depends on climate (people need clothes in cold weather but not in warm weather)
- 3. Yes (people need clothes everywhere)

Column 2: What rationales did the student mention? List all codes that apply, in numerical order.

- 0. don't know/no relevant response (student cannot respond, fails to address the question, or does not include a clear rationale (e.g., just repeats that you need clothes without elaborating))
- 1. protection against cold (or illness caused by exposure)
- 2. protection against dirt (clothes keep you clean)
- 3. protection against other hazards (clothes keep you dry, prevent sunburn, protect against insect bites, etc.)
- 4. modesty (clothes cover body parts that we want covered or that other people/society want covered; you would feel funny naked; people would laugh at you; etc.)

5. other (student produces some other response that is substantive but not codable in the preceding categories: (people wear clothes to express their individuality, because they like variety, etc.).

The next three questions focused on distinctions between business clothes, work clothes, and play clothes.

3. Bankers and lawyers and certain other business people wear business clothes. Can you describe these business clothes that bankers or lawyers wear? . . . Why do they wear these clothes?

Column 3 How did the student describe business clothes?.

0. don't know/no relevant response (student cannot respond, fails to offer a substantive response that speaks to the question, or expresses guesses in a word or two but fails to make a coherent statement)
1. student describes formal or semi-formal clothing (fancy, dressy, good, expensive, etc. clothes; tuxedos, suits, ties, vests, dresses, skirts; gray or dark-colored clothing over white shirts for men or colored blouses for women; dark or formal shoes)
2. instead of describing more formal business clothes, student describes work clothes or uniforms (waiter or waitress outfit; work shirt with name displayed, etc.)
3. other (student produces some other response that is substantive but not codable in the preceding categories)

Column 4: What reasons does the student give to explain why business people wear business clothes?

0. don't know/no relevant response (student cannot respond, fails to offer a substantive response that speaks to the question, or expresses guesses in a word or two but fails to make a coherent statement)
1. student only repeats reasons why people in general wear clothes, without speaking specifically to why business people wear business clothes
2. they want or need to present a good appearance to the public (dressing well is expected of them by their boss or their clients, they work in a dressy place and need to look like they belong there, their clothes reassure the public and help people identify them as professionals, it's the proper way to dress for business, etc.)
3. student confuses business clothes with work clothes and responds accordingly (talks about uniforms or the need for heavy clothes to protect the worker from dirt, injuries, etc.)
4. other (student produces some other response that is substantive but not codable in the preceding categories: they want to show off how rich they are, etc.)

4. People who work on farms or in factories wear work clothes. Can you describe these work clothes? . . . Why do workers wear work clothes?

Column 5: How does the student describe work clothes?

0. don't know/no relevant response/incorrect response (student cannot respond, fails to offer a substantive response that speaks to the question, expresses guesses in a word or two but fails to make a coherent statement or says that work clothes are the same clothes worn anywhere else)
1. old, worn clothes that the worker doesn't mind getting dirty (old, holey or greasy clothes; informal clothes such as plaid shirts, overalls, denim work shirts or pants, t-shirts or sweatshirts, shorts or jeans, etc.)
2. heavy clothing that provides protection against insect bites, slivers, or other potential work-related injuries (protective clothing generally; thick or heavy shirts and pants; gloves; aprons; hard hats; work boots or heavy shoes; sun hats; etc.)
3. uniforms
4. other (student produces some other response that is substantive but not codable in the preceding categories)

Column 6: What reasons does the student give to explain why workers wear work clothes?

0. don't know/no relevant response (student cannot respond, fails to offer a substantive response that speaks to the question, or expresses guesses in a word or two but fails to make a coherent statement)
1. student only repeats reasons why people in general wear clothes, without speaking specifically to why workers wear work clothes
2. workers wear old or worn clothes so they don't ruin their better clothes or get them dirty
3. protection: work clothes protect workers from insect bites, slivers, or other bodily harm and minimize the degree to which they get grease, dirt, etc. on their bodies
4. other (student produces some other response that is substantive but not codable in the preceding categories)

5. When we are just relaxing at home, we wear casual clothes or play clothes. Can you describe these play clothes? . . . Why do we wear play clothes when we want to relax or play?

Column 7: How does the student describe play clothes?

0. don't know/no relevant response (student cannot respond, fails to offer a substantive response that speaks to the question, or expresses guesses in a word or two but fails to make a coherent statement)
1. names or describes casual or play clothes (old or worn clothes that you don't mind getting dirty; t-shirts, sweatshirts, shorts, jeans, pajamas, sneakers, sandals, etc.)
2. other (student produces some other response that is substantive but not codable in the preceding categories: clothes that are not as nice as business clothes but nicer than work clothes; talks about play clothes as dress-up clothes for fantasy play; etc)

Column 8: What reasons does the student give to explain why we wear play clothes?

0. don't know/no relevant response (student cannot respond, fails to offer a substantive response that speaks to the question, or expresses guesses in a word or two but fails to make a coherent statement)
1. student only repeats reasons why people in general wear clothes, without speaking specifically to why people wear play clothes
2. you don't have to worry about keeping them clean (we play in old, worn, or cheap clothes that we don't mind getting dirty, that are washable, etc.)
3. comfort (play clothes are soft, comfortable, easy to relax and play in)
4. other (student produces some other response that is substantive but not codable in the preceding categories: play or casual clothes are the default choice when we don't have some reason to wear work or fancy clothes; we use play clothes for dress-up fantasy play; etc.)

6. Some workers wear uniforms, like the police or the people who work at McDonald's. Why do some workers wear uniforms? . . . Are there other reasons why people might wear uniforms?

Column 9: Does the student identify one or more functions of uniforms (beyond the general ideas that people wear clothes to keep them warm, for modesty reasons, etc.)?

0. don't know/no relevant response (student cannot respond, fails to offer a substantive response that speaks to the question, or expresses a guess in a word or two or fails to make a coherent statement)
1. student only repeats reasons why people in general wear clothes, without speaking specifically to why some workers wear uniforms
2. uniforms identify workers to the public as company employees (so people will know that they work there, so people will know that they are a policeman, etc.)
3. uniforms protect the workers or their regular clothing (job-related dirt or grime soils the uniform instead of the worker's clothes, bullet-proof vests protect police, heavy coats and gloves protect firefighters, etc.)
4. workers wear uniforms because their company requires it (code only if student does not explain further by citing rationales 2 or 3)
5. other (student produces some other response that is substantive but not codable in the preceding categories: their uniforms contain special pockets for special equipment; they think that the uniforms look good or fancy; they don't want to dress like business/rich people; the uniforms show their ranking; so the workers know what job they are in; etc.)

Questions 7-9 concern land-to-hand progressions from raw materials to finished items of clothing. They are designed to determine whether students are aware of the animal, plant, or petrochemical bases of clothing fabrics, understand that cloth is woven from threads, and understand that thread is spun wool, cotton, etc. In coding responses to these questions, ignore what the student says about dyeing clothes, decorating them, etc

7. What are our clothes made from? . . . What do we call this material that clothes are made out of?

Column 10: What does the student call cloth?

0. don't know/no relevant response (student cannot respond or fails to offer a substantive response that speaks to the question)
1. cloth, material, fabric
2. thread, string, yarn, knitting, stitching
3. wool, animal skin/fur, leather
4. silk, cotton, linen, velvet, polyester, denim/durable or tough material for jeans
5. sewing machines, factories, stores (used only if 1-4 were not coded)
6. other (straw, buttons, rubber, pillow cases, carpets, steel (for protective clothing), etc.

8. What is cloth made from? . . . How is _____ made into cloth?

Column 11: Does student understand that cloth is woven thread?

0. don't know/no relevant response (student cannot respond, fails to offer a substantive response that speaks to the question, or expresses guesses in a word or two but fails to make a coherent statement)
1. student understands basic idea that thread, yarn, or string is woven or knitted into cloth (which then is cut and sewn to form clothing items) (Distinguish from #7)
2. student understands that pieces of cloth are sewn together to make a clothing item but doesn't realize that the cloth itself is woven from threads (clothes are made by cutting pieces of clothing and sewing them together, etc.)
3. student doesn't understand that cloth is woven from threads and believes that it is made directly by processing raw materials (heating and ironing fluffy cotton to flatten it; machines that "smish" raw cotton or wool; etc.)
4. cloth is made from other cloth (student says that cloth is made from material, fabric, clothing, recycled old clothes or socks)
5. animal sources (student says that cloth is made from animal skin/fur, wool, feathers)
6. plant sources (student says that cloth is made from cotton, linen, silk, silkworms, etc.)
7. student says that cloth is made from thread but doesn't explain weaving (Distinguish from #1)
8. other (student produces some other response that is substantive but not codable in the preceding categories: wood, material from trees, straw, hay, plaster, paper, gel, spider webs, etc.)

9. Most cloth is made by weaving it from threads. Where do threads come from? (If necessary, how is thread made from _____?)

Column 12 : Does student understand that raw material is spun into thread?

0. don't know/no relevant response (student cannot respond, fails to offer a substantive response that speaks to the question, or expresses guesses in a word or two but fails to make a coherent statement)
1. student understands that thread is spun from the raw material (you spin wool to make thread; you spin a wheel that makes it)
2. stores, factories, machines (student implies manufacturing but makes no direct mention of the process of spinning thread from raw materials)
3. unravel/cut cloth (believes that thread is made by unraveling discarded clothing or cutting pieces of cloth into thin strips)
4. materials found in nature are used as thread (hair, animal skin or fur, string, whatever silkworms produce, etc.)
5. other (feathers, paper, silk, wool, weaving, etc.)

Questions 10-13 address students' knowledge about evolution in clothing from the cave days to the pioneer/Pilgrim days to their great-grandparents' generation to today. Instead of attempting to inventory all of the specific things said, the coding focuses on whether or not students possess key ideas about each of the periods mentioned.

10. Let's talk about clothing in the past. Way back when people lived in caves—what kind of clothes did they wear? . . . What were these clothes made of? . . . How did they make the _____ into clothes?

Column 13: Does student understand that cave dwellers wore clothes fashioned from animal skins?

0. don't know/no relevant response (student cannot respond, fails to offer a substantive response that speaks to the question, or expresses guesses in a word or two but fails to make a coherent statement)
1. expresses key idea that cave dwellers' clothes were fashioned from animal skins rather than woven cloth (describes fashioning clothing from animal skins or else describes cave dwellers' clothing as depicted in Alley Oop, the Flintstones, etc.) (Code #1 for all students who express this key idea, even if part of their larger statement is incorrect)
2. fails to articulate the key idea described in #1, but says other things that are generally correct (cave dwellers wore clothes made from wool, thongs; they didn't have dyes or colors then; etc.)
3. doesn't articulate the key idea described in #1 and furthermore says things that are clearly incorrect (clothes were fancy then, they were cut from curtains, they were woven or knitted from thread or cloth, they wore long dresses or robes, they wore Indian clothes, they wore clothes made from leaves or branches, the men wore overalls and the women wore hooded dresses, etc.)

11. Back in the days of the Pilgrims and the pioneers, what kind of clothes did people wear? . . . What were these clothes made of? . . . Where did the pioneers get their clothes?

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respond to the question, 36 named animal or plant sources (fur, wool, cotton, silk, etc.) but did not display any knowledge of weaving, 27 thought that raw materials are processed directly into cloth (e.g., fluffy cotton is ironed or flattened by machines), 23 said that clothes are made by sewing together pieces of cloth (but displayed no knowledge that the cloth is woven), 7 thought that new cloth was made by recycling old clothes, socks, etc., and 17 supplied “other” responses (wood, straw, paper, gel, spider webs, etc.). It was clear that most of the students who did not describe cloth as woven from threads or yarn envisioned it as a solid material akin to leather, plastic, rubber, or paper.

To set the stage for Question 9, students who had not already said so (in responding to Question 8) were told that cloth is woven from threads. Then they were asked where threads come from. Only 27 of the students (about 12%) were able to state that threads are spun from raw material. More than one-third (79) could not respond, 44 thought that threads were (or were made from) found materials such as hair, animal skin, string, or what silkworms produce, 39 said that threads are manufactured using machines at stores or factories (but could not explain the process or gave some explanation that did not involve spinning raw material into threads), 18 thought that threads were obtained by cutting up or unraveling already existing cloth, and 15 gave “other” responses (suggesting that threads come from feathers, paper, silk, wool, weaving, etc.). In summary, although most students had generally correct ideas about clothing being manufactured from substances derived from plants and animals, only about one-fourth of them understood that cloth is woven from threads and only about one-eighth understood that threads are spun from raw material.

The following examples are representative of the responses from students who varied across grade, SES, and achievement levels.

Column 14: Does student possess the conventional images of the clothes of the Pilgrims and/or the pioneers?

0. don't know/no relevant response (student cannot respond, fails to offer a substantive response that speaks to the question, or expresses guesses in a word or two but fails to make a coherent statement)
1. conventional description of Pilgrim clothes (men wearing black, gray, or green hats, pants, and coats over a white shirt, with big buckle; women wearing long dresses, shawls, bonnets, aprons)
2. conventional description of pioneer clothes (buckskin or leather outfits, homespun work or "farmer" clothes for men and dresses for women)
3. doesn't describe either Pilgrim or pioneer clothes but does provide substantive response which could be taken as correct (wool clothes, Indian clothes, ruffled shirts and coats, etc.)
4. doesn't describe either Pilgrim or pioneer clothes but makes substantive response that is wholly or largely incorrect (Pilgrim or pioneer clothes were confined to animal skins and did not involve any woven cloth; clothes at that time were just like today's clothes; they wore suits or uniforms)

Column 15: Does the student know that the pioneers had to make most of their clothes?

0. don't know/no relevant response
1. they made all or at least most of their clothes themselves
2. they bought them in stores or from clothing merchants
3. mixed or combination response (made some, bought some)

12. Back when your great-grandparents were children, what were people's clothes like? ... How were clothes back then different from today's clothes?

Column 16: Does the student know that this generation wore cloth clothes?

0. don't know/no relevant response (student cannot respond, fails to offer a substantive response that speaks to the question, or expresses guesses in a word or two but fails to make a coherent statement)
1. generally correct response (student states or implies that most of this generation's clothes were woven from cloth rather than fashioned from animal skins, and perhaps adds generally accurate details such as that their clothes tended to be heavier or less comfortable than ours, drab for lack of modern dyes and design processes, etc.)
2. incorrect: too far back in time (student suggests that people only wore animal skins then or describes clothing from cave dweller, Middle Ages, Pilgrim, or pioneer days)
3. incorrect: no difference (student says that the clothing of that generation was just like today's)
4. incorrect: other (clothes were fancier then than they are now, people were poor then and didn't wear clothes, they wore uniforms, etc.)

13. How have today's clothes been improved over clothes in the past? . . . Do you know about any inventions that have made clothes better than they used to be?

In coding responses to Question 13 (in Columns 17 and 18) include things that the student said in responding to Question 12 about improvements or inventions that have led to today's clothing.

Column 17: In what ways are today's clothes improved over earlier clothing? Code all categories that apply in numerical order.

0. don't know/no relevant response (student cannot respond, fails to offer a substantive response that speaks to the question, or expresses guesses in a word or two but fails to make a coherent statement)
1. today's clothes are more aesthetically varied (because we now have so many colors and processes for decorating them with pictures, designs, beading, etc.)
2. today's clothes are warmer, better at keeping you warm
3. today's clothes are more comfortable because they fit better or because they include sandals or light shoes in addition to heavy boots, light clothes in addition to heavy overalls and dresses, shorts in addition to longer pants or dresses, etc.
4. today's clothes can be lighter or softer because we don't just depend on wool or animal skins, we now have finer rather than coarser threads, etc.
5. clothes are now mass produced and sold in stores that offer good variety and quality
6. other correct: student makes statements, not codable in previous categories, that are generally correct (today's clothes are tested for safety, they are better cleaned and cared for, they can be made cheaper, etc.)
7. incorrect: student makes statements that are incorrect (today we make clothes from feathers but we didn't in the past)

Column 18 What inventions does the student name? Code all categories that apply, in numerical order.

0. none
1. sewing machine
2. spinning wheel or modern spinning machines
3. weaving looms
4. ironing/pressing machines and equipment
5. clothes washers or dryers
6. other (better needles, sheep shearing equipment, etc.)

14. How do you think your shirt (dress) was made? . . . What was the first step in making it? . . . Then what? . . .

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Column 19: Code each of the steps that the student mentioned, in numerical order.

- 0. don't know/no relevant response: Student cannot respond or makes some statement that is not a substantive response that speaks to the question (they get the materials and they make them; they make them and sell them in stores, etc.)
 - 1. process raw material (shear sheep, pick and clean cotton, etc.)
 - 2. dye to add color
 - 3. spin thread or yarn from raw material
 - * 4. weave cloth from thread or yarn
 - * 5. cut cloth into shaped pieces that will form the major parts of the garment
 - * 6. sew, stitch, or knit the pieces together to form the basic garment
 - 7. add trim, ruffles, belt loops, buttons, pockets, collar, etc.
 - 8. add a decorative design, logo, etc.
 - 9. other: substantive responses that speak to the question but are not codable in previous categories (they make the shirt from the neck down, they glue feathers on it, etc.)
- *Code these categories strictly. If student makes "black box" machine responses (they put the material into a machine that makes the shirt) or vague, unexplained responses (then they make it into a shirt), code "A" for Column 19.

15. Where do you think your shirt (dress) was made? (If student says "in a factory," ask **Where do you think the factory is?**)

In coding responses to Question 15, ignore specific cities or other locations mentioned by the student and instead focus on the two issues coded in Columns 20 and 21.

Column 20: How/where does the student think the garment was made? Choose the one category that best describes his or her response.

- 0. don't know/no relevant response
- 1. handmade by an individual (a farmer, etc.)
- 2. machine-made at a factory, company, laboratory, etc.
- 3. machine made at the store at which it was sold
- 4. other: substantive responses, not codable in previous categories, that speak to the question of how/where the garment was made

Column 21: Does the student offer a rationale to explain the geographical location of the place where the garment was made? Code all categories that apply, in numerical order.

- 0. don't know/no relevant response codable in subsequent categories
- 1. the garment was made somewhere near where it was purchased (in or near the store; in Lansing, Detroit, Chicago, etc.)
- 2. it was made in a factory located where raw materials are plentiful or available in good quality
- 3. it could have been made almost anywhere, clothes are made in lots of different places, etc. (in China, Mexico, etc.)

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4. other: substantive responses, not codable in previous categories, that were offered as explanations of why the garment was made where it was made (by a person in Florida or Alabama; in a factory in California or somewhere far from here; on a farm somewhere, etc.)

16. Are there people in other parts of the world who dress differently than we do? . . . Tell me about that. . . . Why do they dress like that?

Column 22: Codes address whether the student identifies particular "different" ways of dressing, particular types/nationalities of people who dress differently, or both. Code all categories that apply, in numerical order. NOTE: The students' ideas do not need to be correct.

0. don't know/no relevant response/no substantive response that speaks to the question
1. no--people dress pretty much the same everywhere
- *2. yes (without substantive elaboration): student says that there are places where people dress differently than we do but does not give specific examples or explanations (says that they dress differently in China but cannot explain how, says that people have to dress differently because you can't have everyone dressing alike, etc.)
3. identifies types of people who dress distinctively (poor or homeless, boys vs. girls, cave dwellers, Pilgrims, Native Americans of the past, workers wearing job clothes, etc.)
4. identifies styles of clothing without tying them to specific types of people (unattractive vs. attractive clothes, bathing suits, smocks, etc.)
5. climate explanations (people wear fewer/lighter clothes in hot climates but more/heavier clothes in cold climates)
6. economic development/third world explanations (in some parts of the world they don't have access to the kinds of clothes that we wear, so they wear clothes made from leaves or other found materials; they don't have factories or animals to kill; etc.)
7. culture/custom examples: student identifies particular clothing worn by people in a particular part of the world, at least in part for cultural, custom, or religious reasons rather than climate or economic reasons (Mexicans wear sombreros or blankets over their shoulders; Japanese wear kimonos or "weird hats;" Chinese wear little dresses with different make-up, jewelry, and hair styles; Chinese wear flowered patterns and long robes; Chinese wear mostly pants; Chinese wear bigger clothes, mostly red and blue; in some countries they wear saris; in Egypt they wear a long piece of cloth wrapped around them; etc.)
8. other: substantive responses that speak to the question but are not codable in previous categories (they wear colorful clothes in hot places, etc.)

*Code 2 only if 3-8 are not coded.

17. Are clothes today easier or harder to take care of than they used to be? . . . Why?

Column 23: How does the student answer the initial (easier vs. harder) question? Choose the one category that best describes his or her response.

0. don't know/no relevant response
1. harder

2. easier
3. mixed (i.e., harder in some ways but easier in others)

Column 24: If the student says that it is harder to take care of clothes today, what is his or her explanation? Code all categories that apply, in numerical order.

0. not relevant to this student (student did not say that it was harder to take care of clothes today)
1. harder/unexplained (student said that it is harder today but could not give a substantive reason)
2. we have more clothes today so it is harder to keep track of and take care of them
3. machine washing and drying takes longer or is more difficult than hand washing and sun drying
4. today's business clothes/white shirts are harder to keep clean and neat than the clothes worn in the past
5. other: substantive responses that speak to the question but are not codable in previous categories (we get dirtier today)

Column 25: If the student says that it is easier to care for clothes today, what is his or her explanation? Code all categories that apply, in numerical order. NOTE : Many students do not speak directly to the question by comparing today with the past; instead, they talk about what they have to do to take care of their clothes at home, about how more is expected of you as you get older, etc. Such responses should be coded 0 because they do not speak to the question asked.

0. don't know/no relevant response/no substantive response that speaks to the question
- *1. makes some accurate statement about the past vs. today but does not address taking care of clothing (today's clothes are easier to get on and off your body, people in the past had to make their own clothes instead of being able to buy them, today's clothes hold together better, etc.)
2. machines: today we have washers, dryers, etc.
3. lighter, foldable clothes: today's clothes are easier to fold and put away nicely; the heavy, complicated dresses of the past took time to handle, etc.
4. modern storage: today we have hampers, closets, hangers, drawers to help us store and take care of our clothes
5. easy-care fabrics: today's clothes are mostly wash-and-wear, don't require starching, ironing, etc.
6. cleaner environment: better roads, sidewalks, and other features of modern living enable us to stay cleaner/not get as dirty as people did in the past
7. other: substantive responses that speak to the question but are not codable in previous categories (we wash them and then get them dirty, if you get a hole in your jeans you can buy new jeans instead of having to keep repairing the same old jeans, some people are older, today we walk slower and don't fall down and get dirty as much, etc.)

*Code 1 only if 2-7 are not coded.

18. If you were going to buy a shirt, where would you go to buy it? . . . Why? . . . How would you decide what shirt to buy?

In coding responses to Question 18, ignore the specific names of the stores mentioned and instead focus on the issues addressed in Columns 26 and 27.

Column 26: Why would the student buy clothes at the stores mentioned? Code all categories that apply, in numerical order.

0. don't know/no relevant response/no substantive response that speaks to the question
1. they sell clothes (nothing further is said to suggest that the student thinks that this store is better than other stores that sell clothes)
2. they have nice, good quality clothes there (good/pretty/attractive clothes; designer clothes, etc.)
3. they offer a large selection of types and sizes of clothing
4. they offer reasonable prices , good sales, etc.
5. other: substantive responses that speak to the question but are not codable in previous categories (the store is located nearby, it is fun to shop there, etc.)

Column 27: What criteria are considered in making purchase decisions? Code all categories that apply, in numerical order.

0. don't know/no relevant response/no substantive response that speaks to the question (student cannot give reasons beyond personal preference--"If I like it.")
1. appearance of shirt (the shirt looks good, nice, pretty, attractive, etc.)
2. looks good on me (student tries on garment and decides, or is told by parent, that it looks good on him or her)
3. price (reasonable, cheap, you have enough money to buy it, etc.)
4. color: favorite color, likes the color, etc.
5. design/print: likes the design, likes it because it has animals on it, etc.
6. fabric: would look for a silk shirt, flannel shirt, jersey, etc.; would take into account what the shirt is made of in deciding whether to buy it
7. size/fit: it's the right size, fits me well, etc.
8. season: light clothes for warm weather, heavy for winter
9. other: substantive responses that speak to the question but are not codable in previous categories (soft, thick, smooth, clean, the same as the old one that you are replacing, etc.)

19. Along with our clothes, we wear shoes. What are shoes made of?

Column 28: Code as many of these categories as the student mentions, in numerical order. In coding Column 28, include what the student says in response to both Question 19 and Question 20.

0. don't know/no relevant response/no substantive response that speaks to the question
1. leather, suede, animal skin, snake skin, alligator skin, patent (i.e., patent leather) etc.
2. wood

3. rubber
4. plastic (elastic), styrofoam, polyester
5. material, fabric, cloth, soft stuff, fuzzy stuff, wool, cotton, silk, threads or "sewing" (if described as raw material for the shoes, not just as the way to connect the parts together)
6. string, laces
7. other (stone, rocks, metal, rope, beads, feathers, velcro, lights, colors)

Column 29: Does the student know that leather is animal hide? Choose the one category that best describes his or her response.

0. not applicable: student never mentioned leather or mentioned it but was not asked what it is
1. doesn't know: when asked what leather is, student could not respond
2. incorrect: when asked what leather is, student responds incorrectly (made from rubber, wood, etc.)
3. correct: student describes leather as animal skin, cow hide, deer skin, etc.

20. How do you think this shoe was made? . . . What was the first step? . . . Then what?

Column 30: In coding answers to this question, ignore what the student may say about obtaining raw materials in the first place or about sending the finished product to a shoe store once it is completed. Focus on what the student says about the actual process of manufacturing shoes. Code all categories that apply, in numerical order.

0. don't know/no relevant response: student cannot respond, fails to offer a substantive response that speaks to the question, or expresses guesses in a word or two but fails to make a coherent statement (they get gold for one part, they just make the shoe, they put the shoe in wood, etc.)
1. process raw materials: tan hides, clean or soften leather, process rubber or plastic until it has the right degree of hardness, etc.
2. measure/cut/fashion the parts into the proper shapes and sizes
3. sew, glue, or nail the parts together to form the basic shoe
4. add extras (laces, bows, buckles, polish/paint, designs, labels, etc.)
5. other: responses that are substantive but not codable in the preceding categories

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